WORLD PETROLEUM

OCTOBER 1959

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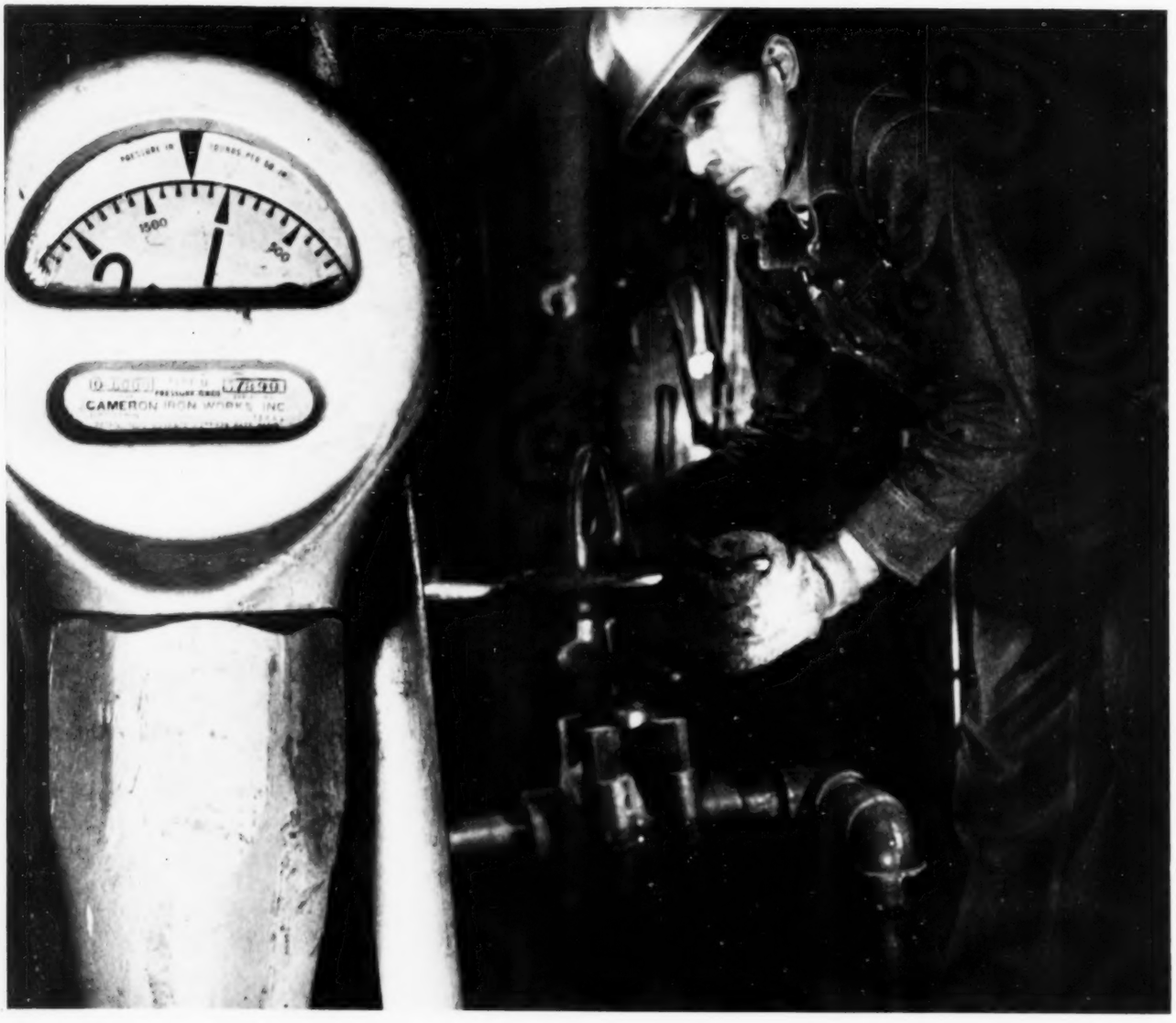

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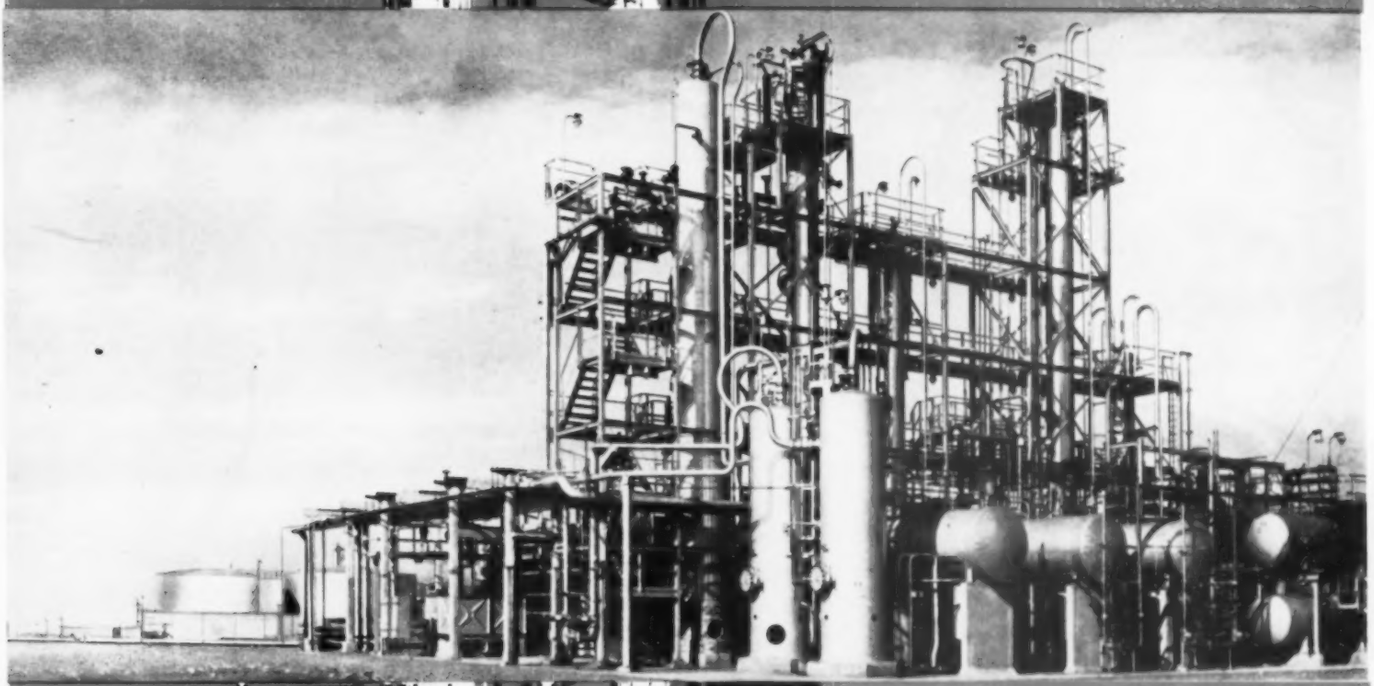

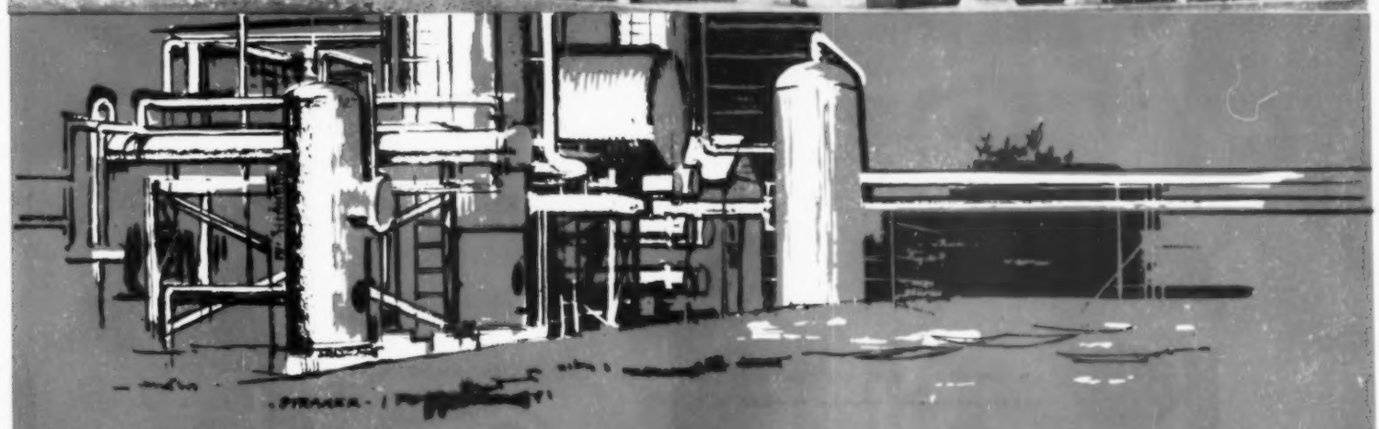

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Petroleum
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JANUARY 1959
Look Like Record?
To the Editor:
We, the employes of the Yorktown, Virginia, four-drum coking unit, are seeking information about refinery record runs to see if we have not in fact set a new record run for a Delayed Coker.
We employes of American Oil Company were assigned to a new four-drum coker built by the Lummus Co. in 1956, and put on stream in January, 1957. We are now in run No. 4, and as of today, have been on stream 240 days without even a partial shutdown. During this run we have averaged approximately 17,000 b/d through the furnace which is somewhat more than design, and to us means that we have not babied the unit for a long run.
The employes of this unit read your magazine and enjoy it very much and would appreciate it very much to see us recognized in your magazine for this accomplishment.
We would appreciate it very much if you will notify us as soon as possible whether we have or have not established this record and, if not, just what the record is.
Howard D. Rogers,
Operator
Yorktown, Va.

* to date
(March 25, 1959)
their record now stands at 354 days..

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Managing Editor G. H. BARROWS
Processing Editor WILLIAM C. UHL
European Editor CECIL W. WOOD
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World Petroleum

THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

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THIS MONTH'S COVER

Loading tankers at night at the Richmond docks of the Standard Oil Company of California. Photograph is by Jon Brenneis, San Francisco, and color plates are reproduced through the courtesy of C. R. Lyman, editor of the Standard of California's *Bulletin*.

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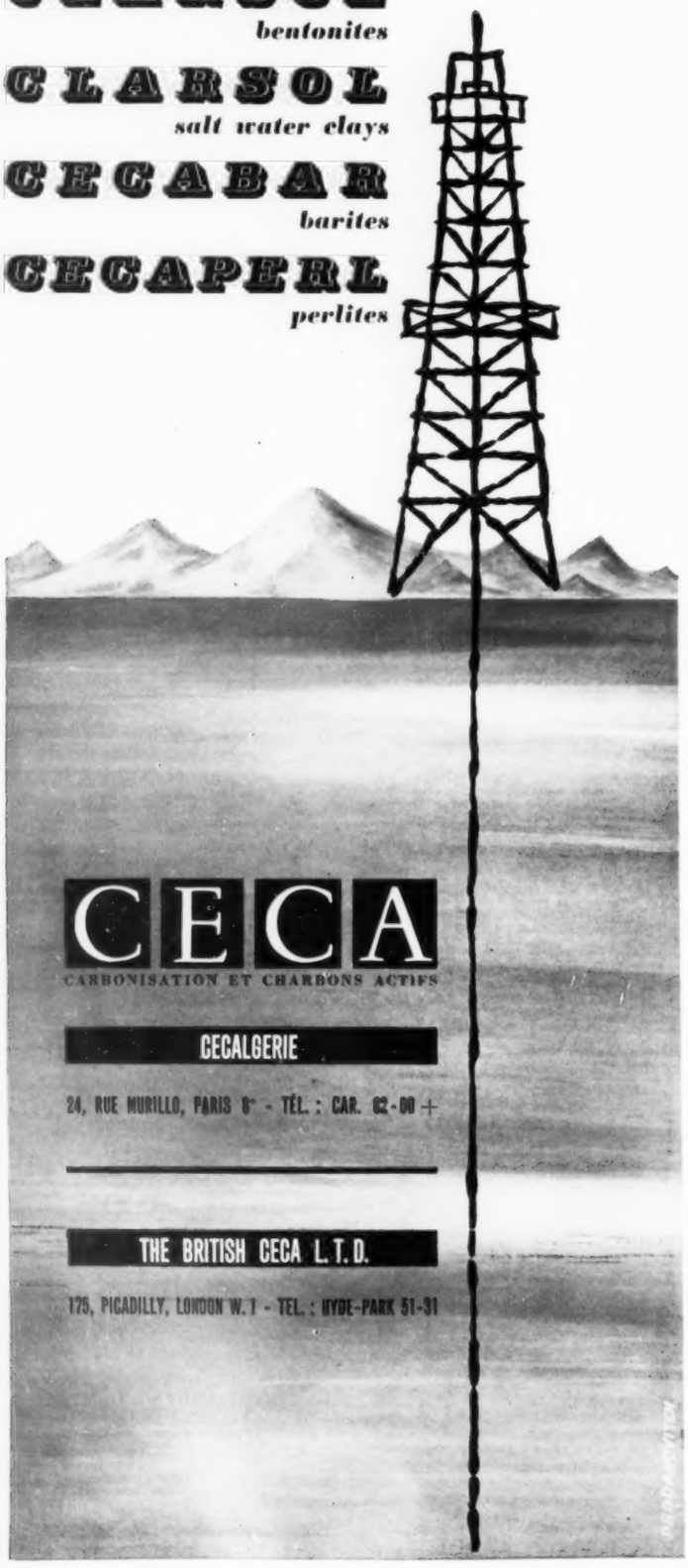
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Washington

By Joseph B. Huttlinger

Congress And The Oil Industry

The first session of the 86th Congress has ended, and the legislators have done little to harm or help oil in the months since the session began in January.

The House and Senate voted to continue their approval of the interstate oil compact for another four years, but with annual reports on its operations still required from the U. S. Department of Justice.

The Congress completed action to make cease and desist orders of the Federal Trade Commission under the antitrust acts final. This means tougher enforcement.

A bill, H.R. 5, to give more, not less, income tax incentive for U.S. companies operating abroad came in for hearings before the House Ways and Means committee, but stopped there. It remains alive next year.

A move to slash oil's depletion allowance from 27.5% to 15% fizzled when Senators voted 54 to 21 against the proposal. Foes of depletion allowance will be back when the House Ways and Means committee opens hearings in November.

A natural gas bill, backed by the industry, again was introduced by Rep. Oren Harris, D., Ark., but got nowhere when President Eisenhower refused to even ask for it in his legislative program this year.

Antitrust bills to block price discrimination, allow fair trade pricing, slow down mergers, curb pricing by manufacturers who sell both at retail and to customers and on functional discounts to wholesalers came in for hearings and are still alive for next session opening in January.

The oil imports program, announced in March, was set for thorough hearings before a subcommittee under Sen. Joseph C. O'Mahoney, D., Wyo., but the Senator got tied up in other things, and then had a stroke, and has been in a hospital.

President Eisenhower's request for a study on disposing of the Naval Petroleum Reserves was ignored.

A House antitrust subcommittee issued a report on party lines asking what amounts to divorcement for oil pipelines. Chairman Emmanual Celler, D., N.Y., of the subcommittee, promptly introduced a bill to forbid pipelines from paying dividends to shipper-owners.

A bill to double to 600,000 acres the amount of oil and gas lands one company may have in Alaska under lease or option passed the House and Senate, but was vetoed by President Eisenhower. The veto came after Secretary of the Interior Fred A. Seaton and Republican Senators arranged a party line fight on the measure, in a surprise move. With the veto, Congressional leaders dropped plans for a major overhaul of public lands leasing laws, including higher rents.

Pending in the closing days of the session was a simple leasing measure to protect persons taking leases innocently from

Pipeline

persons not entitled to sell them. Also pending were proposals looking toward higher gasoline taxes, and to set up a 16-man House and Senate committee to study and recommend a national fuels policy, which could include end use controls to save oil and gas and use coal.

Antitrust agencies continued to file new suits against oil companies. The Federal Trade Commission, for instance, filed price charges against Atlantic Refining Co., and Standard Oil Co. (Ind.), in connection with gasoline sales. And FTC continued hearings on pending cases. FTC found Sun Oil Co. guilty in one price case that is being appealed to the courts. At Philadelphia, A U.S. District Judge found Sun guilty of engaging in exclusive dealing with its gasoline dealers. At San Diego, another U.S. District Judge agreed to a consent settlement of the government's big antitrust action against West Coast oil majors. The majors called the settlement a victory for them. Texaco, Inc. refused to agree and the case remains to be tried.

Residual Control Lifting Urged: The U.S. State Department is urging lifting of import controls over residual fuel oil. One reason is to allow Venezuela to sell more oil in the U.S. Another is that during July, U.S. importers brought in 3.5 million barrels of residual less than they were authorized to import. So, State asks, why have the controls at all?

Secretary of the Interior Fred A. Seaton, however, has an answer to both assertions. As for the under lifting, he feels this may be seasonal, and that as cold weather comes on, imports will be up to the quota levels.

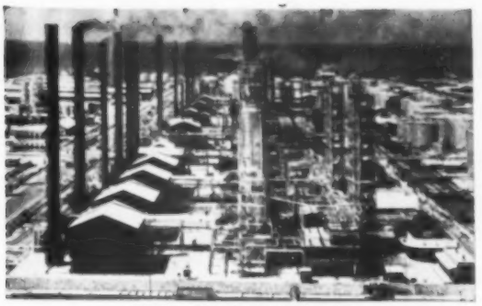
Seaton, who objects to changes in the rules of the import program during a quota period, also wonders if Venezuela would be helped by removal of residual controls. There is "no guarantee" he feels that removal would move more Venezuelan oil to the U.S., as Venezuelan residual is more expensive than residual from the Middle East.

One reason that Venezuelan oil is more expensive, he explains, is that Venezuela has a 65 to 35 split on profits with oil companies compared with 50-50 for most of the Middle East producing countries. So, he said, there have been increases in residual oil imports from the Middle East. While they have not been "substantial," he said, "you will see them go up in the future."

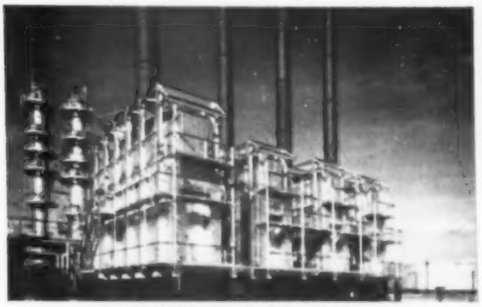
Alaska Contracts Signed

Six contracts for exploration and development of oil and gas in Alaska have been signed between the Interior Department and oil companies. The contracts cover 3,589,475 acres under oil and gas lease or application.

Since the first was signed, Feb. 6, 1953, seven exploratory wells have been drilled. Phillips Petroleum Co. drilled three in the Katalla Yakataga area which has been terminated. Colorado Oil and Gas Corp. drilled three in the Icy Bay-Cape Fairweather area. Standard Oil Co. (Calif.) drilled one in the Kenai Peninsula Arm area. In addition, another is being drilled in the Becharof-Egegik area, and three more must be started by the end of 1961.



CRUDE HEATERS, VENEZUELA



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WASHINGTON, D. C., HOUSTON, MONTREAL, MARACAIBO, LONDON, PARIS, THE HAGUE

Of the three that must be started, one is in the recently approved Katalla Yakataga No. 1 area by the end of this year, and one each in 1961 in the Knik Arm and Napatuk areas.

The latest development contract was signed with Pan American Petroleum Corp., covering about 465,280 acres in the Napatuk Creek area near Bethel. Companies expected to join in the work are Bristol Bay Oil Co., the Sunray Mid-Continent Oil Co. and the Empire State Oil Co., holders of acreage in the area.

The Pan American area is similar to the Mississippi marshland delta and is 60% water covered. Drilling equipment can be moved in only in the winter. Pan American will devote 1960 to geophysical prospecting. The contract provides for minimum expenditures of $950,000 on exploratory work and drilling of three exploratory wells, the first to be started by March 1, 1961. In addition, Pan American must pay bonuses and rentals. After the second well is started, half the total area must be turned back to the government because of mineral leasing acreage limits.

The U.S. petroleum industry cut down on its foreign investment last year, but appears about to step them up again according to the U.S. Department of Commerce. Oil companies made direct investments in their foreign operations of $690 million last year, a sharp drop from the total of $1,700 million in 1957. Total direct investment at start of this year was $9,681 million. Despite the drop in investment, the total exceeded the average for the 1951-55 period, the department explained. Most of the decline from the 1956-57 peak occurred in Latin America, although the bulk of the change was in Venezuela.

There were also sizable cutbacks in Canada, the United Kingdom, Germany and a few Far Eastern countries. Capital flows were generally lower and depressed earnings in most countries also reduced the amount available for reinvestment.

"In view of the work being done or already programed to develop larger proved reserves and enlarge refining and transportation facilities in many countries, based on expectations of a steady increase in world demand for petroleum products, this industry is probably entering another period of rising outlays abroad," the Department of Commerce said.

Earnings from oil investments abroad also dropped, the department said, by about $316 million to $1,307 million. The earnings included $384 million from Venezuela, $103 million from the United Kingdom, $637 million from the Middle East, $86 million from the Far East.

Earnings dropped $300 million in Latin America with a drop of 6% in crude oil output and added taxes in Venezuela which charged $130 million against earnings. But in the Middle East, earnings rose substantially because of a 14% rise in production.

Fight For Canadian Gas

While it's been given little attention, a new and small gas company is fighting a battle to bring Canadian gas to the USA, over the opposition of domestic gas companies. St. Lawrence Gas Co., Ogdensburg, N.Y., a new subsidiary of The Consumers' Gas Co. of Toronto, Canada, proposed to buy gas from Trans-Canada Pipe Lines, Ltd., for the Massena-Ogdensburg, N.Y., area.

Lined up against the proposal are Tennessee Gas Transmission Co., and New York State Natural Gas Corp., and Niagara Mohawk Power Corp. New York State proposed to serve the same area with domestic gas through facilities of Niagara Mohawk.

Involved are many of the same issues of gas supply and Canadian export approval as lie in the case of Midwestern Gas Transmission Co., also proposing to bring Canadian gas to the Midwest. The St. Lawrence project, however, is relatively modest, calling for spending $3 million the first year and $6 million ultimately for 73 miles of small diameter lines to serve 10 communities.

(Continued on page 92)

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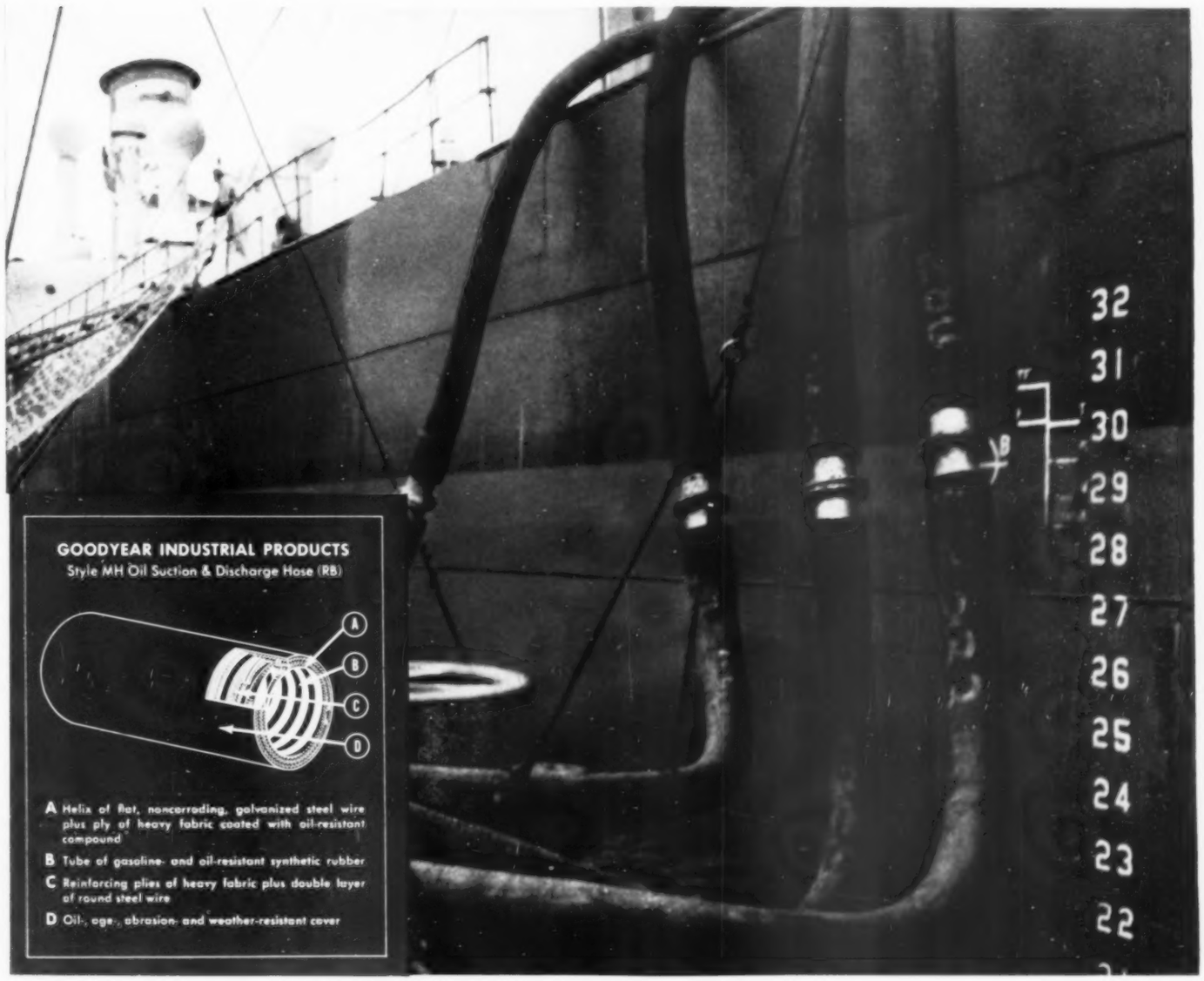

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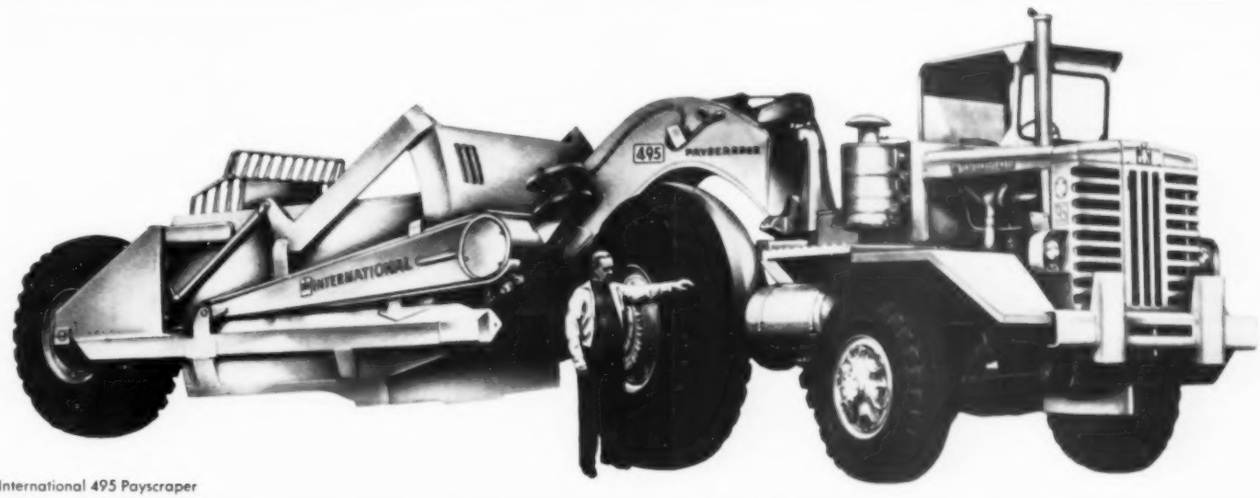

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LONDON LETTER

By Cecil W. Wood

Imports Over 1 Million B/D

United Kingdom oil imports in the half-year, at 1,953 million barrels and easily a new high record, show a rise of no less than 41.3 million or 26.8% over the same period of 1958. This represents the huge daily average of 1,023,524 barrels, the first time the million-barrel per day level has been reached over such a period; for June alone the average was 1,073,540 barrels.

Crude oil alone, at 149.2 million barrels (824,391 b/d) represented 76.4% of the half-year's total imports and was an increase of 33.5 million barrels (29.0%) over the January-June 1958 period. The Middle East supplied 76.3% of this, or 113.9 million barrels valued at £122.1 million: for the first half of 1958 the Middle East crude total was 92.5 million barrels (value £106.8 million), representing 80.0% of all crude consignors.

Summarized details for these periods are given in the accompanying table.

JANUARY TO JUNE

	Quantity in 1,000 barrels		Value in £ million	
	1959	1958	1959	1958
Imports:				
Crude oil				
Total	149,215	115,669	164.7	137.6
Refined oil:				
Motor spirit	10,867	9,564	20.6	18.3
Spirit, other than motor spirit	487	554	1.2	1.2
Kerosine	6,153	3,964	11.1	6.7
Lubricating oil	1,858	1,298	5.3	4.6
Gas oil	8,807	7,710	15.2	12.4
Diesel oil	1,255	155	1.9	0.3
Fuel oil	16,617	15,095	17.3	17.6
	46,043	38,340	72.6	61.1
Crude and refined	195,258	154,009	237.3	198.7
Exports:				
Total liquid products	28,697	29,375	45.1	46.9

To amplify the half-year's picture, it can be added that, comparing these periods, the cif value of crude oil imports fell 0.58 d/imp gal (7.1%) to 7.57d, and refined oils as a whole 0.22d (2.0%) to 10.71d. The largest product decline was the 0.85d (10.7%) shown by fuel oil to 7.13d/gal.

Trading conditions have become more keenly competitive notwithstanding the greatly increased consumption. Preliminary figures indicate that (excluding refineries' own use) this will be about 16.3 million (long) tons for the half-year, or a rise of 17% over the 14.0 million tons in the 1958 period. Price changes in the half-year have been as follows per imperial gallon: diesel and gas oils—one penny; kerosine and light distillate fuel—one half-penny; and fuel oil (heavier grades)—one farthing.

In view of the above rise in crude imports, it is not surprising to find greatly increased refinery activity. Preliminary figures are only available for the first five months, but these indicate a rise of nearly 27%—a monthly average throughout of 3,233,000 tons against 2,552,400 tons in the same period of 1958.

Extends Use Of Petroleum

Distillers Ltd. has given up the production of acetone and butyl alcohol by the fermentation of molasses, due to its continued high cost. This has been carried out at Bromborough Port since 1935 by the subsidiary, Commercial Solvents (Great Britain) Ltd. This is now being wound up and some plant and equipment have been transferred to Distillers' Hull factory, where certain of the manufacturing operations formerly carried on at Bromborough are being re-established using petroleum-based materials.

It is also announced that the new plant of British Hydrocarbon Chemicals Ltd. to make "Rigidex," the high-density polyethylene, is now being commissioned. The new phenol plant incorporating Distillers' own process has made good progress and is expected to start up towards end-1959. The third cracker—with 70,000 tons/year ethylene capacity and the largest producer outside the USA—is due for completion in 1960. It will more than double the present Grangemouth capacity and, after meeting the demands of current and projected ethylene users at Grangemouth, there will be a small surplus for future developments. When these projects are completed, the total investment of British Hydrocarbon Chemicals (50:50 Distillers and British Petroleum) will be over £30 million.

Esso Petroleum Company's new 12,000-gallon airport refueler. With a pumping rate of over 1,000 gpm the unit can fuel a Viscount in less than two minutes.

Control panel of Esso's new "Python" refueling truck.

World's Largest Refueler

Esso Petroleum Co. has taken into service at London Airport the first of its new "Python" aircraft refuelers. This has a capacity of 12,000 imperial gallons, over twice as big as any other at this airport and claimed as the world's largest. Two centrifugal pumps driven by high-speed hydraulic motors deliver fuel through two hoses at a total rate of 1,000 gpm after passing through filters and water separator units arresting particles down to 2½ microns.

This British-made articulated vehicle, which has a long wheel base Foden tractor powered by a C.6.M Rolls Royce diesel and a semi-trailer 3-compartment interconnected tank unit built by Steel Barrel Co., has the following dimensions: length overall, 55 ft; unladen height, 13 ft.; width, 8 ft.; unladen weight, 25 tons; and laden weight 75 tons (approx.). To avoid contamination by scaling, the mild steel plate tank is treated internally with Pinchin Johnson's "Tanclene" and all pipework is hot tin dipped. The tank is fitted with a twin rear axle and running gear designed and supplied by Carrimore Six Wheelers Ltd. coupled to the tractor unit by a "Davis Magnet" turntable. Other equipment includes: Avery-Hardoll bottom-loading; Zwicky pressure control; Emsco Brass Manufacturing Co. valves, swing joints, etc.; Purolator Ltd. filter separators; while the pump delivery system and all auxiliaries were designed and manufactured by Andrew Fraser. Self-acting fire protection is incorporated.

New British Equipment Catalog

The immediate impression of the 1959/60 edition of "British Petroleum Equipment" is the great size to which this biennial catalog of equipment and services available from members of the Council of British Manufacturers of Petroleum Equipment has grown since it first appeared in 1947. Then only about 400 pages, now there are nearly 900, 790 of which give technical descriptions from 320 firms, with many illustrations and charts. The remaining pages give (a) the list of council members and relevant details, and (b) a classified list under some 2,400 headings of the equipment made and services offered by the 450 member firms. Additional information worthy of consideration would be a list of firms holding US manufacturing licenses and the names of specialities available.

The very high standard of presentation and the fine color printing in this catalog, for which C. H. W. Roles & Associates Ltd. are responsible, deserves special mention. It is good also to note that with each edition more and more members are following the council's wish that the pages shall be as technically informative as possible, and not merely "decorative."

Copies are available from CBMPE, 2 Princes Row, Buckingham Palace Road, London, S.W.1. The price is £2.10s., plus postage (UK 3s., abroad 5s.).

New Antifreezes

Two new brands of antifreeze being marketed by Shell-Mex and B.P. for both gasoline and diesel engines incorporate new and highly effective additives to prevent corrosion and to increase the resistance of engine coolants to foaming. Both are based on a formula developed by the chemical research laboratory of the Department of Scientific and Industrial Research and comply with the final form of the British standard specification to be issued shortly.

Burmah Oil Co. Enters USA

Burmah Oil Co. is extending its sphere of operations into the western hemisphere and is forming a new wholly-owned subsidiary in the USA for this purpose to be known as Burmah Oil Western Co. This new concern will take up certain oil exploration interests in the USA in cooperation with the Murphy Corp., of El Dorado, Ark., and it is intended that this cooperation will be extended to other spheres as opportunity occurs. Murphy subsidiaries or affiliates in the USA include River States Oil Co. (Evanston, Ill.), Lake Superior Refining Co. (Superior, Wis.), and Ocean Drilling & Exploration Co. (New Orleans, La.). Outside the USA there are "Murphy" companies in Bolivia, Canada and Venezuela.

UK Petrochemicals

Corrections—In the 29th Annual Refinery Review (p. 76) the Shell Haven plant for producing "Nitra Shell" was referred to as "costing over 16½ million." This should have read "£6½ million."

It is also regretted that an error occurred on page 71 in the constituent items of the estimate of end-1958 UK capacity of organic petroleum-chemical production. This should have read:

"Ethyl alcohol, 115,000 tons; isopropyl alcohol, including quantities converted to acetone and other derivative solvents and intermediates, 113,000 tons; polyethylene, 80,000 tons; styrene butadiene copolymers, 77,500 tons; alkyl sulfates, 60,000 tons; butadiene, 55,000 tons; detergent alkylates, 50,000 tons; ethylene oxide, 45,000 tons; butyl alcohols, including quantity converted to other derivative solvents, 40,000 tons; styrene, 40,000 tons; ethyl chloride, 35,000 tons; "Terylene" fiber, 13,000 tons; dichloroethane, 11,000 tons; and aromatics and others, 20,000 tons; total, 754,500 tons.

a better life rolls his way

Once the people of his village had only the barest necessities of life—whatever products they could make themselves. Lack of transportation prevented trade and the progress that comes with trade.

Then great bulldozers, scrapers and cranes went to work. Soon a broad new road pierced the jungle. Now trade flourishes. From farms and factories miles away, trucks bring food, machinery, building materials, clothing—the many good things of modern life.

The power for equipment that builds roads, and for the vehicles that travel them, comes from oil. Assuring a steady flow of oil is a prime concern of Standard-Vacuum. In Asia, Africa and the lands of the Pacific, Stanvac continually searches and drills for oil, then refines and markets many finished petroleum products. Stanvac is proud of its role in helping the peoples of these areas in their forward march.

STANDARD VACUUM OIL COMPANY

White Plains, New York

POWERS PROGRESS

A. J. Prince.

Consultancy In France

A. J. Prince, who has retired from the post of development director of Imperial Chemical Industries' heavy organic chemicals division, is taking up residence at La Lezardiere, Cinq-Mars-la-Pile, Indre et Loire, France, where he intends to devote some time to industrial consultancy work. Mr. Prince has had a long and distinguished career in chemical engineering and process development work, particularly in connection with ICI's large petroleum-chemical projects and notable the development of plasticizer alcohol production by the OXO process.

Catalysts For The Common Market

Universal-Matthey Products Ltd., British producers of platinum catalysts and jointly owned by Johnson, Matthey & Co., precious metal dealers, and Universal Oil Products Co., has formed a German subsidiary to facilitate trade in the Common Market countries. This company is Universal-Matthey Products (Deutschland), with headquarters at Cologne where a producing plant will be established.

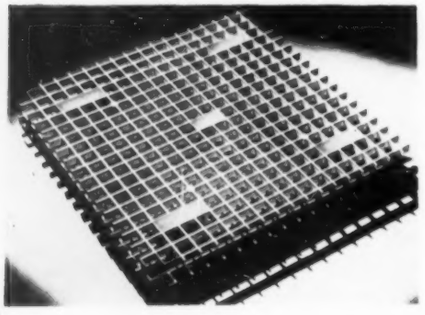
"Anglo-Ecuadorian" Refinery

Anglo-Ecuadorian Oilfields Ltd. has decided to restart work on its refinery under erection at La Libertad, raising its capacity to 300,000 tons a year. This decision to complete the plant follows an Ecuadorian government decree granting specific price increases for refined oils in the Ecuadorian market. These have long been sought by the company, which now states that while the increases granted are not as great as had been hoped for originally, they are sufficient to justify the above decision.

Plastic Cooling Tower Packing

Two more large "Counterflo" induced draft Head Wrightson-Fluor cooling towers which Head Wrightson Processes Ltd. are providing for the Shell-Petrochemicals site at Carrington, Manchester, are of particular interest in that they will incorporate the new plastic "Poly-Grid" packing. This will be made of Shell Chemical Co.'s high-density polyethylene moulded in 3 ft x 3 ft grids with 2-in. sections having $\frac{3}{8}$-in. "splash strips" along the top of each rib with 2-in. spacing between the decks by means of 5 tapered supports. Each grid for this project weighs about 4 lb.

This new packing, which can also be made in the less expensive high-impact polystyrene, is finding increasing use and particularly in replacing thin timber lathes in existing cooling towers.



Cory Brothers' Acquisition

Cory Brothers & Co., a member of the Powell Duffryn group and owners of oil depots in the UK and abroad, has acquired the share capital of MacCleaster Chemical Co. This is a private concern, formed four years ago, which manufacturers a range of anti-corrosion compositions for metal protection which have found wide applications. Production facilities are to be expanded and the organization built up to provide a comprehensive advisory service on all industrial corrosion problems.

US Equipment Links

H. & E. Lintott Ltd., engineers and steel fabricators of Horsham, Sussex, and a member of the Ayling Industries group, reports that since the completion a few months ago of the "joint venture association" with Born Engineering Co., of Tulsa, enquiries in excess of two million pounds have been received for process heaters. This agreement—which it is stressed is not merely a licensing arrangement—covers the sale and manufacture in the UK and the sterling area of the entire range of Born-designed, direct-fired process heaters and furnaces, catering for 500,000 to over 200 million Btu per hour and incorporating many unique features. Two new plants are being built to fabricate these specialties and sales offices have been opened in London and Italy: the former, with D. A. Lindsay as sales manager, is at Grand Buildings, Trafalgar Square, and the latter is at Via Benigno Crespi 70, Milan.

Sir John Wrightson, Bt. (left) and Mr. Hank Widdell

A new British company—McKee Head Wrightson Ltd.—with an authorized capital of £100,000, represents an agreement between Head Wrightson & Co., of Thornaby-on-Tees, and Arthur G. McKee & Co., of Cleveland, Ohio, to combine their great experience in the design, engineering and building of petroleum refineries and chemical plants throughout the world, exclusive of North America. Under the chairmanship of Sir John Wrightson, Bt., there will be equal representation on the board of the new company, whose headquarters will be in London. These two concerns have already been long associated in steel industry projects in various countries and the extension of this partnership into a wider and more concrete form is a very important step in Anglo-American engineering cooperation.

L. A. Mitchell Ltd., Manchester, has negotiated a license with the Fostoria Corp. of Pennsylvania, for the manufacture and marketing of a range of pumps of the latter's design known as "Chempump." A company—Chempump (Great Britain) Ltd.—has been formed to handle this development.

John Thompson Ltd., Wolverhampton, has concluded a licensing agreement with Parkersburg Rig & Reel Co., W.Va., whereby a wide range of Parkersburg items can be offered within the sterling area.

New Appointments

F. J. HERBERT has been appointed general manager, export sales, of The English Electric Co., and S. E. BOLTON assistant general manager with special interests in the North American continent. For the last two years Mr. Herbert has been manager for overseas atomic projects and Mr. Bolton has been area export manager for North America since 1955.

Monsanto Chemicals Ltd. announces the following appointments: Dr. N. B. DYSON, works manager and later general works manager of the Newport (Mon.) factory, takes over the newly-created post of manager for production and control, and is succeeded by G. V. TAYLOR, formerly assistant works manager at Newport; K. H. HANDY, works manager at Fawley for the last two years, is appointed works manager at the Ruabon factory and is succeeded at Fawley by Dr. E. W. BODYCOTE, formerly acting works manager at Ruabon.

R. F. NEWMAN, CBE, has been appointed managing director of Transport Equipment (Thornycroft) Ltd. to succeed Lieut. Commander J. W. Thornycroft, CBE, who has relinquished this post but continues as chairman and a director. Mr. Newman has also been elected a director of John I. Thornycroft & Co. Ltd.

British Equipment Notes

Whessoe Ltd. has installed cobalt-60 industrial equipment at its Darlington works for the radiographic examination of thick welded plates. This has a source of 2,000 curies and is believed to be the most powerful in industrial use.

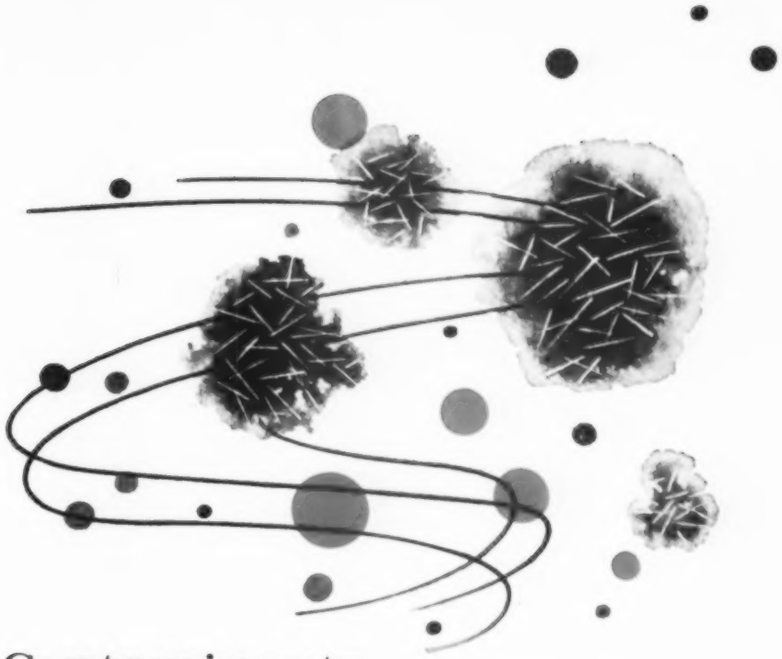
Research by *Crane Packing Ltd.*, of Slough, Bucks., into causes of premature failure of mechanical shaft seals has established that this can be due to the severe increase in temperature above that of the liquid being handled which occurs between the seal faces and which is transmitted to the body of the seal. A contact face temperature of seals handling water at 230° F and 25 psi can, for instance, rise by from 390° F to 750° F above the water temperature. To dissipate this heat Crane has introduced new designs of standard seats with extended surfaces in the mechanical shaft seals. There is thus a greater area through which heat can be transmitted to the coolant liquid and its introduction is claimed to make possible the use of simple seal and seal arrangements on liquids at much higher temperatures than was possible previously.

Leyland Motors Ltd. now has sales and service facilities available in Jordan for users of its truck and industrial diesel engines, etc. Its new agent is the Near East Export Co., P.O. Box 892, Amman.

To meet the needs of the petroleum and chemical industries, *Steels Engineering Installations Ltd.* has installed facilities at an entirely new 3-bay factory which is now announced as completed. This is at Crown Works, Sunderland, one of whose features is stated to be the plant available for the design and fabrication of pressure vessels and heat exchangers. Included in the equipment mentioned is a pyramid plate machine which will roll $\frac{1}{2}$-in. thick, 10-ft wide stainless steel plate down to 18-in. diameter and a 2-in. x 5 ft 6 in. mild steel plate to a minimum inside diameter of 2 ft 6 in. The claim is made by the company that with its vast experience in pipe fabrication, it is now in the almost unique position of providing heat exchangers, pressure vessels and pipework from within the one organization.

British Industrial Gases Ltd., of Enfield, Mdx., is now manufacturing the 77N Multi-Stage Gaugeless Regulator, designed to deliver a constant working pressure regardless of incoming pressure and which has a minimum variation from full flow to no-flow. The cylinder contents indicator is graduated in "steps" and once the regulator is set the delivery pressure remains constant from full to empty cylinder pressure. This is one of the items covered by the recent agreement with the Harris Calorific Co., Chicago, and the regulator has been approved by the American Underwriters' Laboratories as 100% safe.

Gaugeless Regulator



Are you plagued with Contaminants

in your gas stream?

UNION CARBIDE Mono-and Diethanolamine provide petroleum refineries and natural gas systems with excellent acid-gas absorbents. At ambient temperatures these organic bases react with the acidic contaminants in gas streams to form salts. Upon heating, the salt decomposes and the amine is regenerated. Hydrogen sulfide removed in this manner can subsequently be converted into elemental sulfur. This provides an economic continuous process for removing these undesirable materials from the gas stream.

Aqueous solutions of mono-and diethanolamine have strong affinity for hydrogen sulfide and carbon dioxide and produce excellent results in their removal from natural and refinery gases. Furthermore, the low vapor pressure of diethanolamine makes it an excellent adsorbent for the removal of hydrogen sulfide from sour refinery gas at low pressures. The low solubility of diethanolamine in hydrocarbon allows the counter-current washing of petroleum distillates with aqueous diethanolamine to remove acidic components.

In some plants, monoethanolamine is used along with diethylene glycol for simultaneous desulfurization and dehydration. Besides reducing the hydrogen sulfide content, this mixture also removes water vapor which might form hydrates and block transmission lines.

Our laboratories and field testing facilities are continually engaged in extensive research activities designed to improve gas treating processes. The results of this research are readily available to the industry through our Technical Service Department. For additional information and technical data, (CWP-10) write today to the Chemicals Department, Union Carbide International Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, New York, U.S.A., Cable Address: UNICARBIDE, New York.

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chemicals

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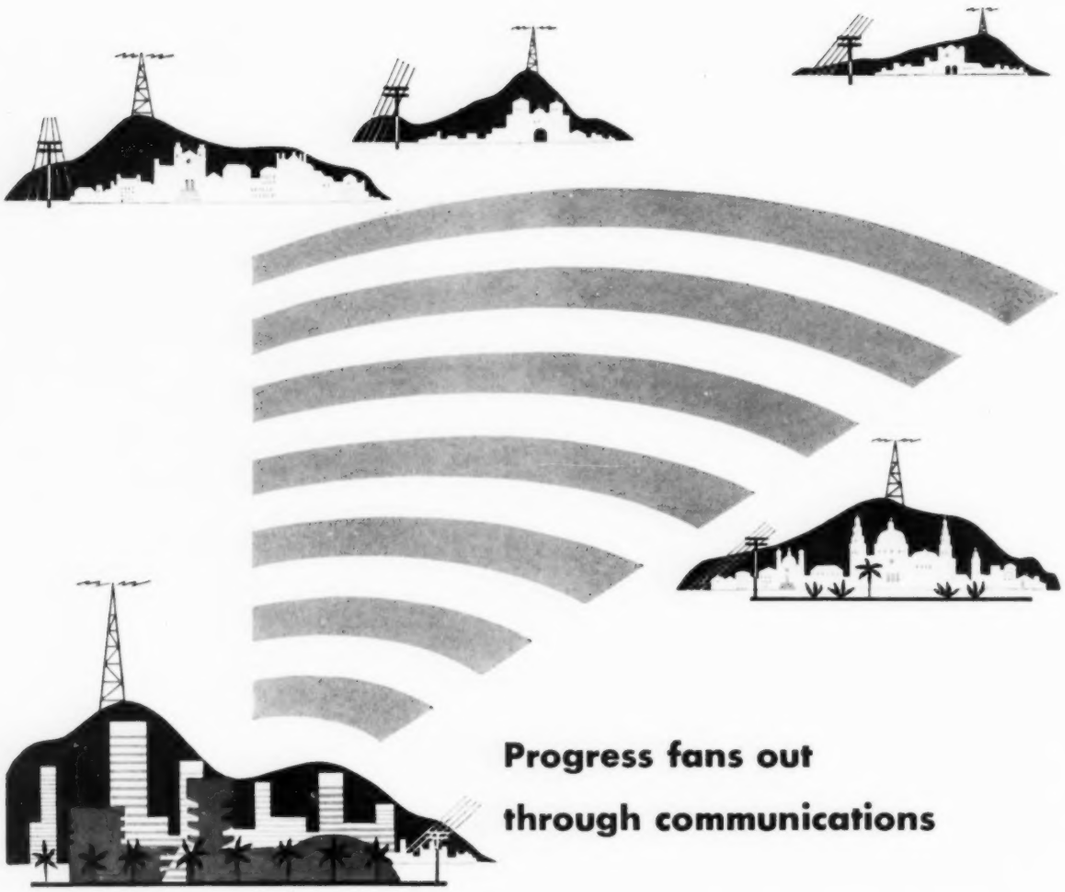

Progress fans out through communications

Effective communications is a vital key to growth and progress in all phases of community life. The telephone and telegraph, radio, point-to-point and over-the-horizon microwave are important lines of communications that fan out from a city to its outlying communities and to other cities, countries and continents.

Every form of telecommunications is a specialty of ISE—an associate of International Telephone and Telegraph Corporation.

ISE consultants and engineers plan complete systems, down to every detail and utilizing the latest, most modern equipment. ISE supplies everything needed to build a system, from central exchange automatic switching equipment or microwave transmitters and antennas, to the last bolt and nut.

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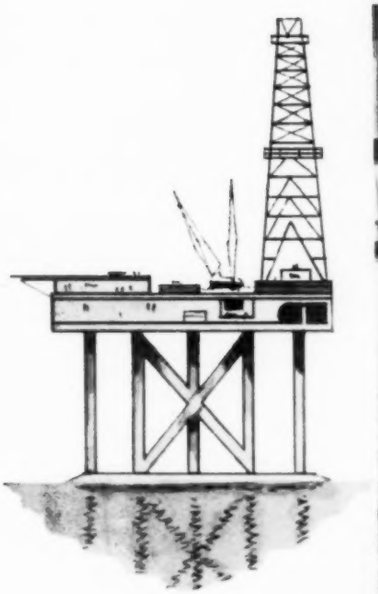
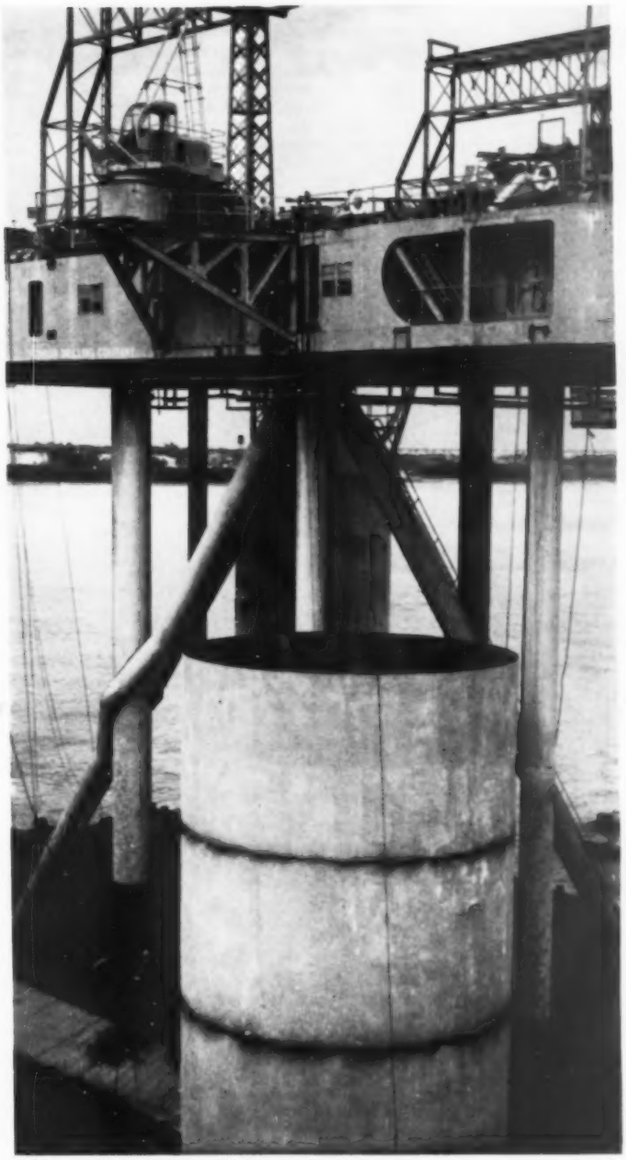
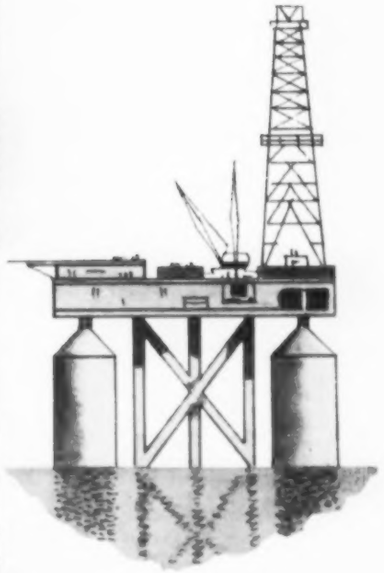


from hydraulically actuated piston-type stabilizing system





to caisson-type system

Engineering skill and top facilities for heavy steel fabrication made it possible to complete this major conversion in nine short weeks. And, in addition to the fabrication and installation of the "stability bottles", numerous other changes were made during the contract period. Avondale's engineering experts closely supervised the job from start to finish, including setting the converted rig on its first location. For this same speed and efficiency on *your* next conversion job . . . call Avondale.

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CANADIAN NOTES

Big Gas Find In Canada

A gas well with four times the open flow potential of any of the four previous wells drilled in Alberta's Dick Lake Field has been announced by British American Oil.

The new B.A.—C.P.R. Atlas 7-15 Well, 55 miles south of Edmonton in the south half of the Dick Lake Field operated by B.A., encountered a gross D3 pay section of 451 ft. The 7,645 foot well achieved an estimated absolute open flow potential of approximately 1.2 billion cubic feet of gas per day following a series of productivity tests.

The highest flow rate obtained during the tests was 81 million cubic feet of gas per day at a wellhead flowing pressure of 735 pounds per square inch. The measured bottom-hole pressure draw down at this rate was only 10 pounds per square inch. The B.A.—C.P.R. Atlas 7-15 Well was drilled as a joint venture by B.A., California Standard, Phillips Petroleum and Husky Oil.

Borden & Trans Mountain

Trans Mountain Oil Pipe Line Co. has the best chance to capitalize on the Borden Commission recommendation for serious effort to increase Canadian crude oil exports to U.S. by swapping supplies. West coast market which it serves on Puget Sound alone could be increased by 100,000 b/d if Canadian crude were used exclusively. This would double present throughput.

Energy Board Appointments

Appointment of Ian McKinnon, of Calgary, as chairman of the National Energy Board, has been acclaimed by the industry. Mr. McKinnon, who is on leave for a two-year term, continues to hold his position as chairman of the Alberta oil and gas conservation board. The Canadian Petroleum Association expressed the hope that the energy board will proceed quickly with gas export applications.

No Prorationing For Saskatchewan

In spite of formal request by Saskatchewan conservation board for crude oil purchasers to file nomination schedules monthly, there is understood to be no change in the provincial government attitude that production proration is not necessary or desirable. Consideration may be given to rateable take within individual fields which are on voluntary purchaser proration, mainly medium gravity crude.

Pipe Mill For Alberta

Camrose Tubes Ltd. has been incorporated in Alberta as owner and operator of the biggest-inch steel pipe mill ever to be built in Canada. Jointly owned by Page-Hersey Tubes and Steel Co. of Canada, the new plant, to be built in Camrose, 60 miles southeast of Edmonton, will have capacity of 325,000 tons per year of 16-in. to 42-in. pipe. Canadian Bechtel Ltd. is the contractor.

Alberta Trunk Expands

The Alberta Gas Trunk Line Co. Ltd. has made formal application for a permit to build its proposed $97 million Foothills system. The project is contingent on authorization of the Alberta Natural Gas Co. export proposal, which it is understood will be opposed in Ottawa and Washington by Trans-Canada Pipe Lines Ltd.

Saskatchewan Oil Line Proposed

Mid-Saskatchewan Pipe Lines Ltd., subsidiary of Royalite Oil Co. Ltd., has been granted a permit to build a small 12-mile oil pipeline from the Dodsland field in west central Saskatchewan to the existing Coleville pipeline. The contract has not yet been awarded and no start date has been set.

Mobil Drilling Rig

A drilling rig that can be moved from one site, over reasonable rolling or level terrain, and spotted on another site in a matter of minutes was recently put in service in eastern Alberta by General Petroleums Drilling Co., Ltd.

Conventional in most respects, the rig is unique in that an ordinary heavy duty tractor-truck can be backed under it, coupled to it and moved at a good speed while the mast remains erect.

It is equipped with four wheels on the rear of the rig. When the rig is working, it rests on a conventional foundation. To move it, a hydraulic lift raises the substructure and permits the wheels, together with the tractor, to carry the rig.

The device was engineered by Cunninham Engineering Ltd. while Frank Briggs was in charge of the construction at General Petroleums' Highfield shops in Calgary. It is capable of drilling to about 5,000 feet, weighs about 70,000 pounds and was designed especially for eastern Alberta and Saskatchewan drilling.

New Canadian Condensate Plant

Canadian Oil Co. will build a $4 million condensate recovery plant about 25 miles south of Red Deer, Alberta, close to Canadian Oil's Innisfail oil field discovery. Construction began in September and the plant is scheduled to go on stream in the late fall of 1960. Canadian Bechtel Ltd. is contractor.

The new plant will produce 30,000,000 gallons of gasoline per year, besides diesel fuel and a small amount of heating oils.

Richfield Holdings In Fraser Valley

Richfield Oil Corp. has assembled surveying rights covering more than 200,000 acres in the Fraser Valley of southwestern British Columbia. Part of the acreage has been acquired under an agreement reached by Richfield with a group of independent oil companies and private individuals. An announcement from Vancouver stated that Richfield made a cash payment to these companies for permits covering about 45,000 acres. The companies included Van Tor Oils and Explorations Ltd., Royal Canadian Ventures Ltd., Peace River Petroleums Ltd., and Gulf Developments Ltd. As part of the agreement, the companies retain a 3% gross over-riding royalty in any oil or gas production which might be realized.

New Canadian Gas Reservoir

Fort Nelson area of northeastern British Columbia is expected to become a hot-spot of activity as result of two gas discovery wells which show such promise that, according to B. C. Mines Minister W. K. Kiernan, they may have opened "a great new reservoir of tremendous potential productivity." Completion of both wells was announced in late February by the operator, Gulf States Oil Co. of Canada, wholly owned subsidiary of Western Natural Gas Co. Company is prepared to extend its Peace River gas pipeline 200 miles into the new area as soon as developments warrant. The company's 650-mile 30-in. line now connects the Peace River gas fields with Vancouver and the international boundary.

SSC Promotion

Glenn E. Blackledge, former manager of continuous velocity logging for Seismograph Service Corp. of Canada, has been elected vice president in charge of Canadian operations, Calgary, Alberta. Mr. Blackledge has seen SSC service in Venezuela and Mexico, as well as in Tulsa headquarters. He transferred to Calgary in 1956.

Canadian Gas Discovery

Fargo Oils Ltd., Calgary has announced completion of an exploratory well in the Petitot River region of northeastern British Columbia, 70 miles north-northeast of Fort Nelson, B.C. The well Gulf States Petitot River No. 1, is standing as a completed gas well producing from the Middle Devonian (Slave Point) formation. Production from the well has been measured at a rate of 6,480,000 mcf of gas per day on a $\frac{3}{8}$-in. choke, with a flowing pressure of 2,214 psi.

New Appointments

MATT M. NEWELL, general manager of Charter Oil Co. Ltd., Calgary, has received appointment as executive vice president of Charter.

R. E. MANAHAN has been named manager of lands for Pacific Petroleums, Ltd.

R. ANDERSON has been named manager of refining and product supply department, Royalite Oil Co., Ltd. His new duties will commence immediately. He will also direct the finished product transportation facilities of the company.

NORMAN J. ALEXANDER, deputy general manager of James Richardson & Sons, has been elected to the Board of Medallion Petroleums Ltd., Calgary. He has been closely associated with the investment business in Canada for 30 years.

MERRILL RASMUSSEN has been promoted at Pacific Petroleums Ltd. to manager of the production department. He replaces **KELLY H. GIBSON** who has been appointed executive vice president of the company.

ROLAND L. THOMPSON, a director of Royaltie Oil Co. Ltd., Calgary, has been appointed general manager of operations. Other appointments include: **J. A. HARVIE**, manager, exploration and production division; **A. E. MEYER** as manager of refining and sales division; **W. A. HILES**, manager of exploration department; **H. B. HOLMBERG**, manager of production department and **E. F. T. STEVENS**, manager of plants department.

L. M. SANFORD has been appointed senior technologist, head office manufacturing operations, Shell Oil Co. of Canada, Ltd. Prior to his present appointment, he was co-ordinator, data processing, in the company's head office in Toronto.

WILLIAM L. GROSSMAN has been named area exploration manager for Shell Oil Co. of Canada to succeed **R. B. WING**. Mr. Wing has been appointed consultant, exploration economics, in Shell Oil Co.'s head office, New York.

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Where do you fit

in the changing petroleum picture?

records show that 294 refiners have tripled average production—but 160 have succumbed to competition

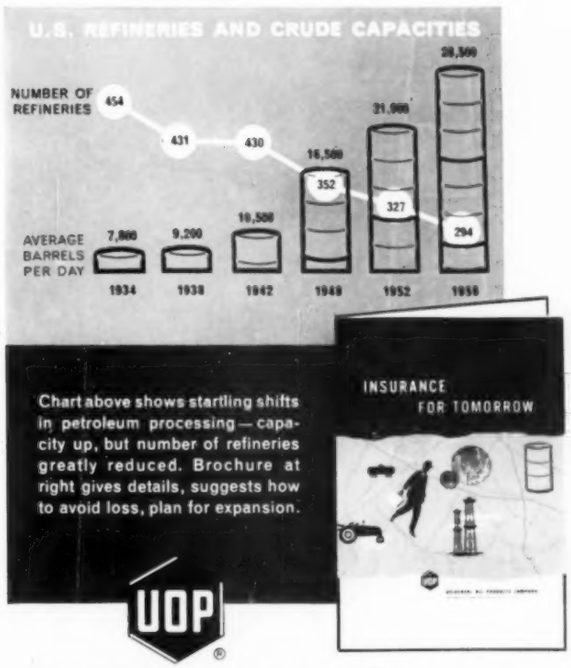

Chart above shows startling shifts in petroleum processing—capacity up, but number of refineries greatly reduced. Brochure at right gives details, suggests how to avoid loss, plan for expansion.

Drastic changes in transportation by road, rail, water and air constantly keep petroleum refiners on their toes. Adding to the complexity of the petroleum refiner's problem are never-ceasing changes in the nature and location of his crude supplies, and of markets for his products.

In this situation there are certain things the refiner can do to avoid losses and capitalize existing opportunities—to utilize his facilities and market potentials to the fullest.

As an aid to intelligent planning, the Economic & Market Research Department of Universal has prepared a bulletin entitled, "Insurance for Tomorrow." It shows how Universal can help coordinate the application of processes to achieve the most economic operation. Send for your copy today. Just fill out and mail the coupon.

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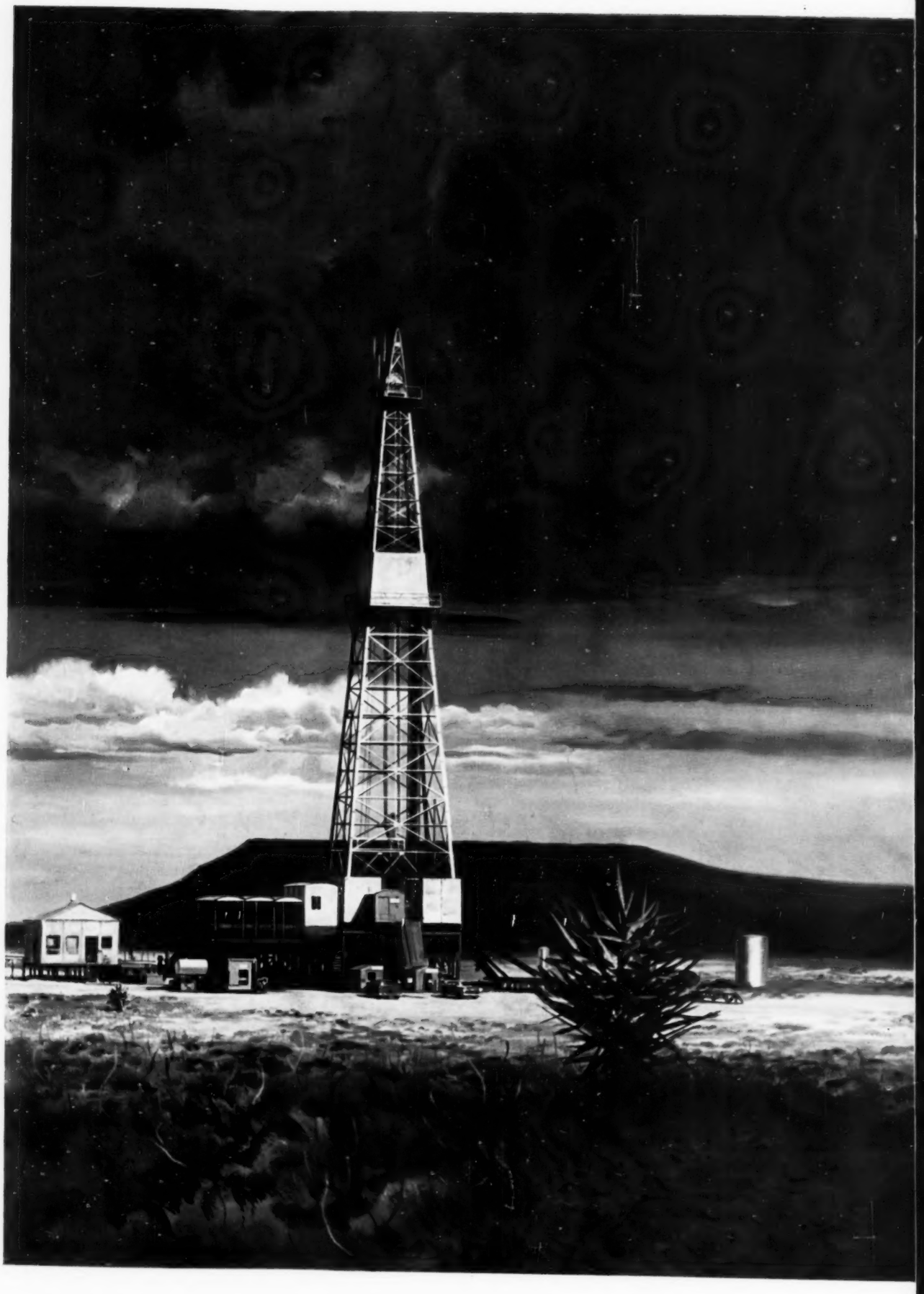

Fifth in a Series — "Evolution of the Rock Bit"

The seven Hughes bits used in drilling below 25,000 feet.

WORLD'S DEEPEST WELL...

and the bits that maintained a half century tradition

When Phillips pushed its Pecos County, Texas, well to an all-time depth record of 25,340 feet, it dramatized the progress of rotary drilling, the skill and teamwork of today's drilling crews, and a product achievement that has had few equals. In the past half-century, Hughes bits have been used in setting virtually every world's depth record.

This almost exclusive use of Hughes bits, when the risks have been greatest, stems from the year-after-year reliability and performance of Hughes bits. Regardless of the year . . . regardless of the type or model . . . the Hughes bits used in previous record wells have been the best of their time.

On the way down to the record depth in the Pecos County well, Phillips used many types of Hughes bits designed specifically for the types of formations encountered. Below 20,000 feet, W7R's and R series bits were used exclusively. An RG-1 was on bottom when the final depth was reached.

We are proud of the part Hughes bits played in drilling this history-making Phillips well. But as important as tools and equipment were to this achievement, it was the drilling crews and the men who directed their efforts to whom the final credit is due.

At Hughes our maximum effort and research are being devoted to developing products that make it possible to fully utilize today's advancing drilling techniques.

At the left is a painting of Phillips' Pecos County well — the first to pass 25,000 feet — drilled on the eve of the oil industry's 100th anniversary and the 50th anniversary of the running of the first rotary rock bit. Enlarged copies of this painting — suitable for framing — are available for the asking. Write: Advertising Department, Hughes Tool Company, P. O. Box 2539, Houston, Texas.

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50TH ANNIVERSARY YEAR 1909 - 1959

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Caltex activities include finding crude oil, refining it into gasoline, kerosene, diesel oil, fuel oil, lubricating oils and asphalt stocks, and transporting this variety of petroleum products in over 70 countries, to where they may be used in local industry, in farming, in construction, and in all forms of transportation.

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LATIN AMERICAN OIL NEWS

Mexican Representative

Pipe Line Technologists, Inc., Houston, has appointed Charles C. Marietta as a special representative in Mexico with offices at NAYARIT #17, Col., Padierna, Mexico 20, D.F.

Costa Rica Test Dry

Compania Petrolera de Costa Rica has abandoned drilling at Porvenir 20 miles south of Limon, Costa Rica, at 6800 feet after mechanical difficulties. The company plans two more holes, one a few miles east of Pascua to be started in October, the second a few miles northwest of Talamanca, also in Limon province. The company, which has spent $12 million (U.S.), faces expiration of its exploration concession Nov. 18, when it will relinquish rights to all but 150,000 hectares of the two million hectares it holds.

Ecuador To Build New Refinery

A recently issued government decree authorizes the construction of a new refinery to satisfy the increasing demand for petroleum products. Simultaneously, the government announced a price increase of 30 centavos per liter of high test gasoline.

Pan American Drilling Up

Pan American Argentina Oil Co., subsidiary of Standard Oil Co. (Ind.) plans at least 100 production wells in the coming year, after completing the required 50 in the first year of its contract which closed July 21. Pan American estimates it can drill the 100 wells in eight months, and then turn to exploratory drilling.

Pan American was to receive four more drilling rigs early in September, one of which can go to 13,000 feet. The four rigs will make a total of 14 which the company has in Argentina. Materials for the 85-mile pipeline which Pan American is to build from its fields to the coast were due in Comodoro Rivadavia about Sept. 1. The line is to be in operation March 1, 1960.

Pan American, which has a production of 3,000 b/d estimates it will have 20,000 b/d by March 1, 1960, and 35,000 b/d by the middle of next year.

New El Salvador Refinery

The government of El Salvador has announced approval for construction of an oil refinery near La Union Harbor. It will be the first one ever to be built in that country and will have an initial cost of $8 million. The government also announced that the refinery will use exclusively Venezuelan and Peruvian oil. If the experiment should prove successful the government will build another large refinery near by. El Salvador has a yearly consumption of about 1,250,000 barrels.

Brazil's Refineries Expand

In 1959 Petrobras will complete a new refining unit at Landulpho Alves Refinery (Mataripe), capacity 22,000 b/d, to raise the total nominal capacity of the Landulpho Alves Refinery to 52,000 b/d by June, 1960.

At the Cubatao Refinery the power house and C and V units are being remodelled to increase capacity by 20,000 b/d, to 110,000 b/d in the first quarter of 1960. Tenders have been invited for the installation of units to produce aromatics and ethylene by the end of 1960.

Petrobras' new Duque De Caxias refinery in Rio State, 60,000 b/d, is scheduled for completion in November 1960.

Brazil-Soviet Oil Deal

Brazil imported 284,412 barrels of crude oil from Russia under a barter deal involving 60,000 tons of Soviet oil for about 19,000 bags of Brazilian cacao.

The imports, during March, were out of total crude oil imports in the first three months of this year of 9,719,530 barrels. Of this, some 4,824,829 barrels came from Venezuela; 3,407,456 from Kuwait and 1,202,833 from Saudi Arabia.

Stekoll Signs Trinidad Agreement

Stekoll Petroleum Corp. has signed a farmout agreement in Trinidad with Dominion Oil Co., subsidiary of Standard Oil Co. of California. The operation will be directed from Caracas by a wholly-owned subsidiary—Stekoll Panamanian Petrolera S.A.

Under the agreement, Stekoll takes over a Dominion Oil lease on 20,000 acres in the Colenso area of S.E. Trinidad. Stekoll will drill four 5,000 ft wells and may rework existing wells on the property.

Cuban Oil Summary

Crude oil runs to stills in Cuban oil refineries came to 25,986,900 barrels during 1958, it is reported by U.S. officials in Havana. Crude oil production in Cuba was 342,532 barrels.

Crude oil imports came to 25,755,400 barrels of which 25,171,600 came from Venezuela and the rest from the U.S. Oil product imports came to 4,392,300 barrels, of which 2,584,600 was fuel oil.

Oil product exports were 6,436,900 barrels, including 3,619,700 barrels of fuel oil, 1,922,00 barrels of distillate, 859,600 barrels of motor fuel regular grade and 34,700 barrels of kerosine. The figures exclude ships bunkers. There were no exports of crude oil, aviation or premium grade gasoline, jet fuel, lube oil or other petroleum products.

Private Refinery Operating

The Capuava Petroleum Refinery of Refineria e Exploracao de Petroleo "Uniao" S. A., one of the few private refineries operating in Brazil, is allowed to operate for its own account up to its nominal authorized capacity of 20,000 b/d.

Production in excess of this, some 11,000 b/d, is for for the account of Petrobras. All profit from the extra 11,000 b/d is being deposited in a special account pending working out of a formula to determine how much of the operating cost of the plant shall be charged to Petrobras.

The plant, which has the second largest catalytic cracker in the world, is one of the few private ones completed in Brazil before Petrobas was given a monopoly on drilling and future refining capacity.

Cuba's Oil Drops

Cuban crude oil production dropped to 49,132 barrels in the first three months of this year, compared with 108, 321 barrels in the first three months of 1958. Shutdown of the Cabaiguan refinery is given as a chief reason for the lack of any production in the Catalina and Jarahueca fields as well as for lowered production of Jatibonico. U. S. officials explain that as a consequence of rebel action, production of these fields was downward as new sources were not found to compensate for depletion of fields.

Peruvian Prices Rise

Peruvian oil product prices, for many years among the lowest in the world, have been about doubled by a recent decree. It relieves the companies there, in particular Jersey Standard's subsidiary, International Petroleum Co., which have been losing money on domestic sales for years.

Other Peruvian statistics in brief: Crude oil production came to 48,744 b/d in the first quarter of this year and natural gasoline output to 284,487. Crude oil runs to stills came to 3,220,194 barrels. Exports of crude oil came to 526,503 barrels in the first three months and of products to 956,039 barrels. The crude was exported to England, 269,037 barrels; Argentina 136,399 barrels; and Brazil 121,067 barrels.

Argentina Contracts For Wells

YPF in Argentina is expected to pay $18,750,000, or about $37,500 per well, to Kerr-McGee Oil Industries under a contract for the drilling of 500 oil wells. This is estimated from the contract price of $19.80 per linear meter drilled and $50 per hour of work on well termination services; 60% of the payments are to be in USA dollars and the rest in Argentine pesos.

YPF aso is to furnish tubing for the wells, a supply of water for the drilling operations, and will pay the taxes levied on the company.

Depth of the wells is estimated at 1,400 to 1,800 meters. The company will use a minimum of six drilling rigs in its operation, which will be in the south flank of the Comodoro Rivadavia.

Kerr-McGee is to drill 75 wells in the first year of the contract, 200 wells in the second year, and 225 wells in the third year. Kerr-McGee is to turn over the wells on completion to YPF. Kerr-McGee pays a penalty for failure to complete the wells as scheduled.

Present wells in the province of Santa Cruz, where Kerr-McGee will drill, yielded 396 b/d as an average in 1957. Of 123 wells drilled in the province in 1957, only four were dry holes.

YPF also announced signing of a contract for 1,000 wells in the Southeastern Drilling Co. The contracts are under a public tender of February 17, 1959, calling for 4,557 wells over six years. YPF now says plans are to contract for half that number of wells in three years.

YPF announced it will award a contract for drilling 300 oil wells in the south flank of the Comodoro Rivadavis area to Saipem Eni, a private Italian firm.

Cuban LPGas Register

The Cuban Government has created a General Register of Distributors of LPGas to be maintained by the Bureau of Fuels of the Section of Fuels, Sugars and By-Products of the Ministry of Commerce. Distributors or importers of LPGas may apply to be included on the register. It will list those eligible for any duty-free imports of LPGas, if they are continued beyond the present deadline of the new duty-free program of June 30. Authorized importers must specify the quantity of the product they require to bring in duty-free, and make reports on their imports.

Action follows the government decision requiring the mixture of alcohol with gasoline at the rate of 15 to 18%. The government is allowing in more LPGas in anticipation of a reduction in domestic output.

Venezuela Engages Prorating Expert

The Ministry of Mines and Hydrocarbons has asked the Texas Railroad Commission for the services of one of their experts in production prorating. The expert will co-operate with the commission for a period of three to six months. The request was made by the Ministry in a letter sent to General Ernest O. Thompson, a director of the Texas Commission.

Venezuela Offers Scholarships

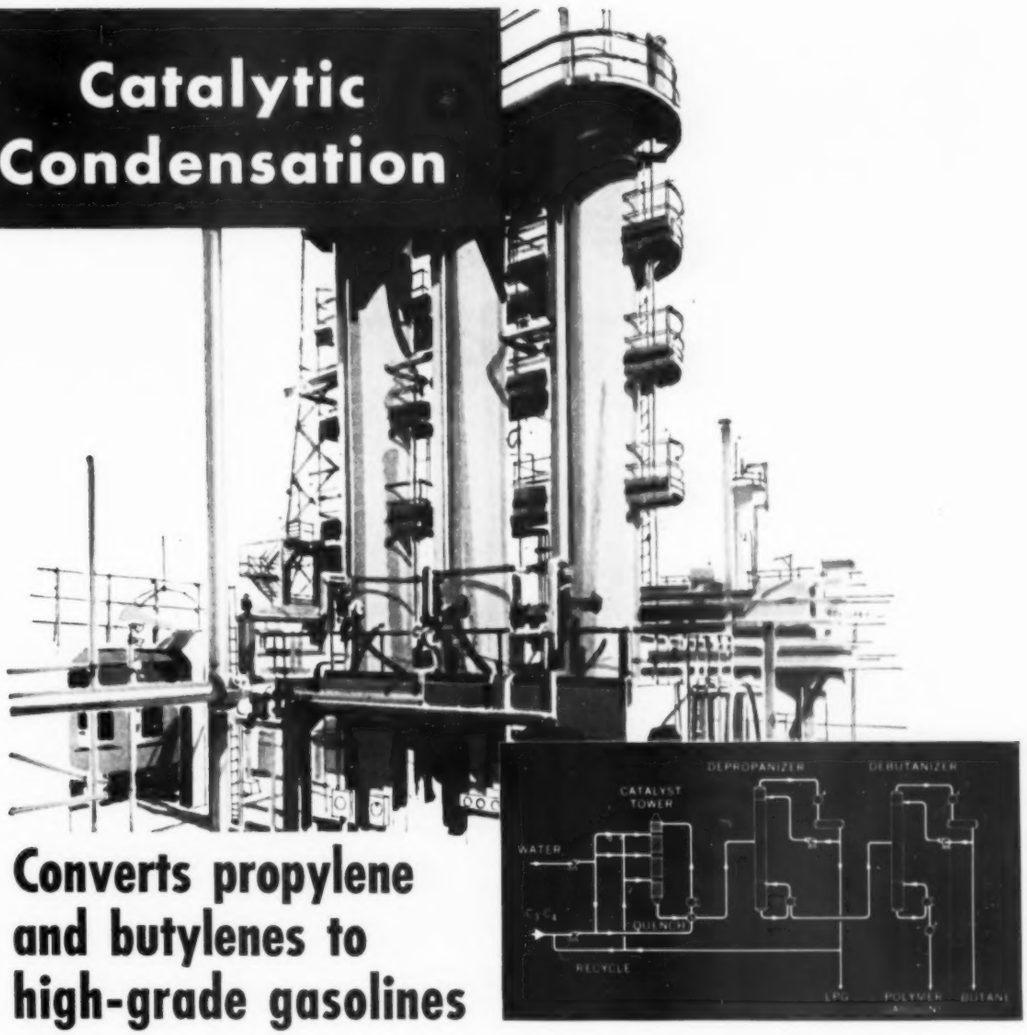
President Romulo Betancourt has offered 20 scholarships to Chilean students who wish to study petroleum engineering in Venezuela. Those who win the scholarships on the basis of high marks and competitive examinations will come to the Petroleum School of Zulia University which is largely supported by the oil companies and staffed by a large percentage of oil company personnel. The scholarships are to last four years if high averages are maintained.

Venezuelan Refining Record

Highest figure of refined products this year is held by Creole's Amuay Refinery in the Paraguana Peninsula, which established a record by processing an average of 305,233 b/d. This figure is the highest ever registered in Venezuela.

LUIS G. MORALES, formerly chief geologist for Petroleo Brasileiro, has been named to head the oil and gas exploration activities of Tennessee Gas Transmission Co. subsidiaries in Argentina and Bolivia. They are Tennessee Argentina, S.A., which is carrying on exploration and development on the Argentine portion of Tierra del Fuego, and Chaco Petroleum, S.A., the operator for four U.S. companies having joint interests in an oil and gas lease in southern Bolivia. Morales was chief geologist for Petroleo Brasileiro (Petrobas) in Rio de Janeiro, Brazil, from 1955 to 1959. From 1945 to 1955, he was employed by the International Petroleum Company and served as exploration manager in Colombia.

Catalytic Condensation



Converts propylene and butylenes to high-grade gasolines

This is another UOP process designed to help the refiner realize his greatest potential. Catalytic Condensation converts the propylene and butylene portions of refinery gas into high grade motor gasolines, by contact with UOP Solid Phosphoric Acid catalyst. Polymerization may be controlled to yield products which, on hydrogenation, produce saturated gasolines of high octane number.

Catalytic Condensation also offers an efficient means for producing specialty polymers of light olefins, for which there is a rapidly growing market for chemical use. For example, propylene can be polymerized to products rich in C_6, C_9, or C_{12} olefins, which are useful as raw materials for producing detergents and alcohols. The process may also be used to react ethylene and propylene with benzene to form, respectively, ethylbenzene for the production of styrene, and cumene for use in manufacturing acetone and phenol.

This is but one of many refining and petrochemical processes available from UOP. Write for process brochure and detailed information.

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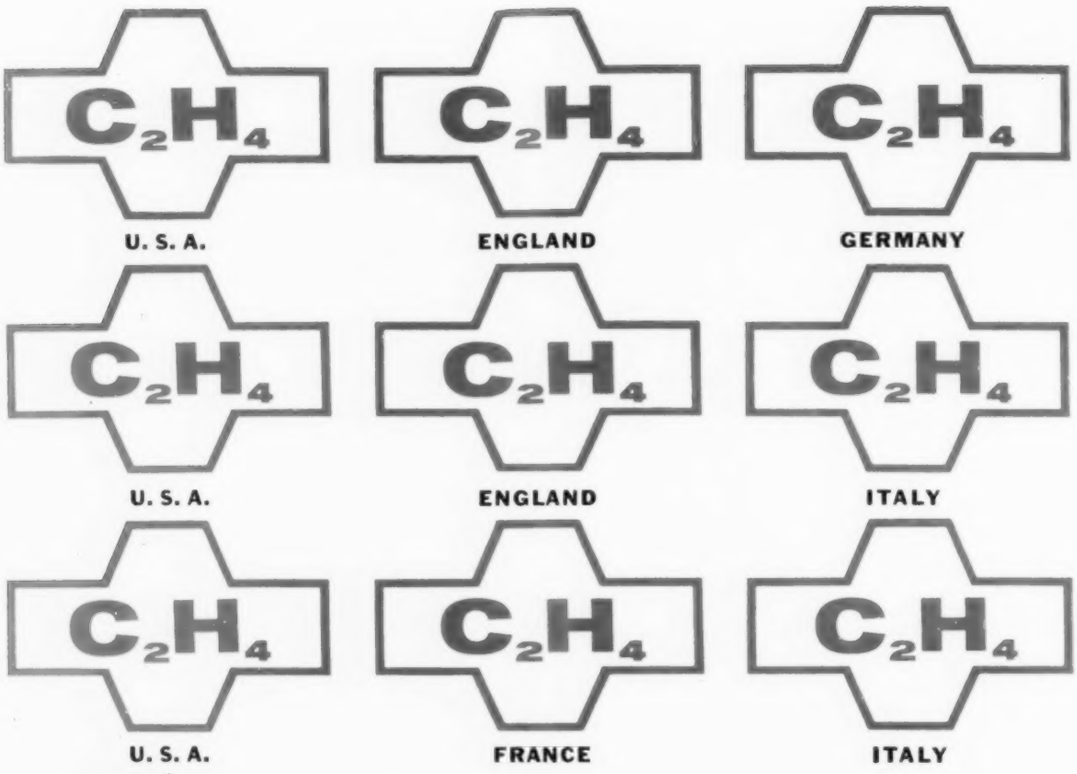

A BILLION-POUND BACKGROUND in Engineering Ethylene Plants

Leading oil and chemical companies on both sides of the Atlantic testify to the Kellogg Organization's ability to engineer ethylene manufacturing and recovery plants. The twelve for which Kellogg has been responsible to date represent an annual capacity in excess of 1,050,000,000 pounds!

Utilizing its high-efficiency steam-pyrolysis process, and many unique design features, Kellogg is unusually equipped to engineer and build economically sound plants for producing high purity ethylene and other valuable olefins from various feed-stocks.

Typical Kellogg design innovations for ethylene recovery systems are: (1) a heat pump circuit which permits tower top reflux to be provided by condensing overhead vapors while doing tower reboiler duty; (2) an auto-refrigeration system based on a Joule-Thomson or Isentropic expansion of tower overhead vapors; and (3) an intermediate condenser and reboiler on the demethanizer to minimize refrigeration requirements.

When considering ethylene plants, call on the billion-pound background of The M.W. Kellogg Company.

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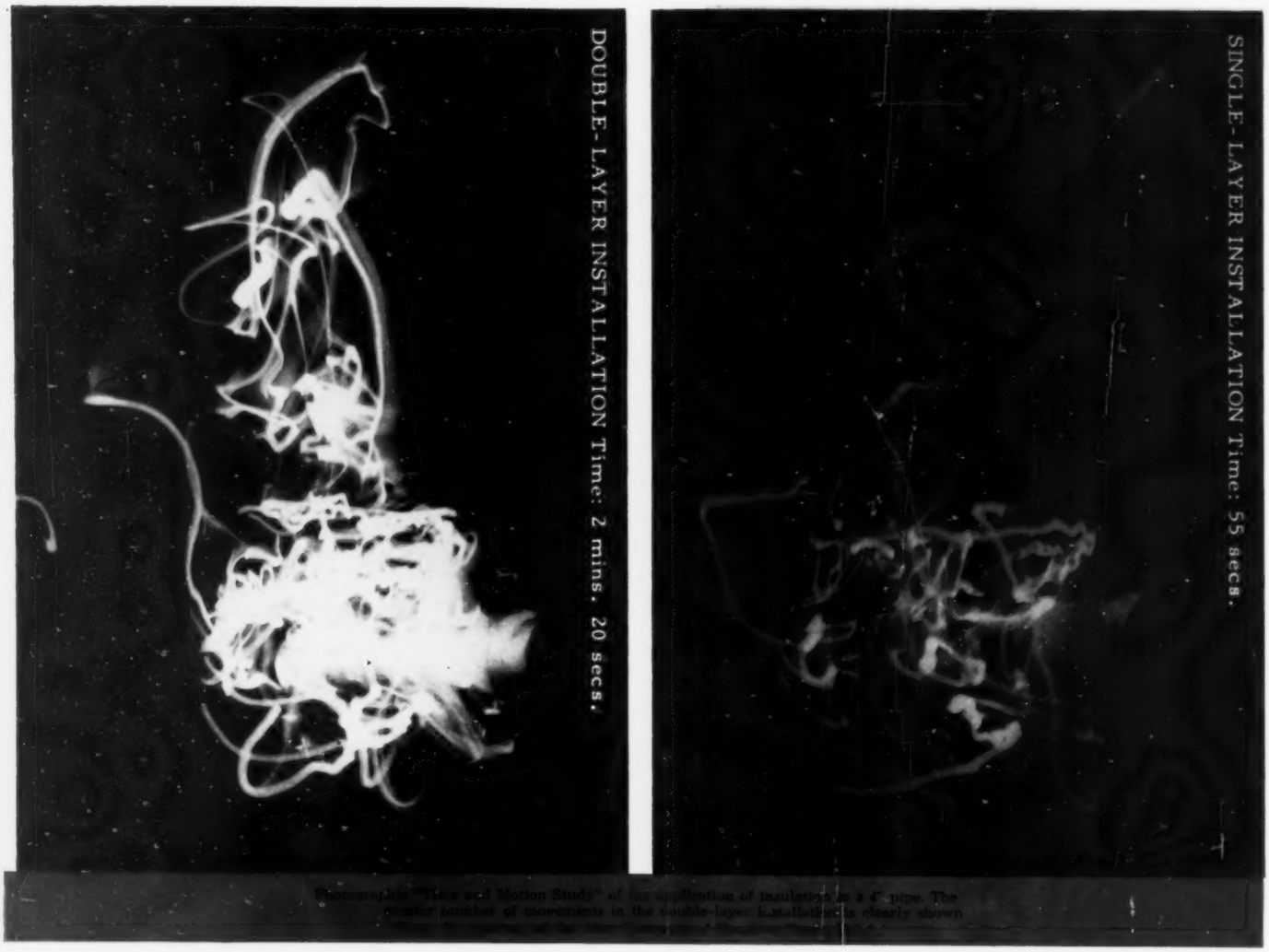
Photographed in the Trianon Room, Sheraton East Hotel, New York, N. Y.

The oilman: big hit in this year's fashion show.

Your wife might be surprised to know just how important your industry is to American women. You and oil helped develop oil-based synthetic fabrics dainty as lace, tough as overalls. Oil-based synthetic dyes that challenge the rainbow. Oil-based treatments that put new life into natural fabrics. The next time you hear somebody start to talk against the oil industry, tell him you're an oilman—and proud of it. And tell him why.

SHELL OIL COMPANY



Photographic "Time and Motion Study" of the application of insulation to a 4" pipe. The greater number of movements in the double-layer installation is clearly shown

Insulation in a single layer! Caposite was developed by The Cape Asbestos Company to avoid the two-layer compromise Caposite does it in one—saving considerably on installation time and costs. Caposite, the amosite asbestos insulation, is designed to withstand temperatures up to 1000° F without loss of efficiency.

LOW JOINT LOSS

The fibrous edges of Caposite knit together at the joints giving a good heat seal and making staggered joints unnecessary

EASY TO HANDLE

Its inherent strength makes it possible to handle Caposite in large sections—for example at 2" thick for 30" n.p.s.—with very little damage and a further saving in installation costs.

One layer— less work

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30000 DWT TANKER

Size 84' x 45' x 641' long
Draft 34' 1½"
Power 13500 SHP
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S/S Atlantic Enterprise 30,000 DWT Tanker Built for Philadelphia Northern Steamship Co.

Demands for this vessel are increasing for general transportation of crude and refined petroleum products. Eleven (11) of this type have now been built for our customers.

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VENEZUELA

Shell To Carry Propane Locally

The 8,000 ton tanker "Gyrotoma" of the Royal Dutch Shell group will be conditioned as a propane gas carrier. After conversion has been completed in November, the ship will load on propane at Shell's Cardon refinery, for distribution along ports of the Venezuelan coast.

A system of vertical gas storage cylinders will be installed which will allow the carrying of oil around them in the empty spaces, thus serving a two-fold purpose. A system for loading on and off the gas will also be installed.

Venezuela To Arab Congress

Venezuela will be invited to the Second Arab Conference on Oil to be held in Lebanon in 1960, according to an announcement made by Muhammad Salmon, director of the Foreign Oil Matters Department of the Arab League. The Venezuelan government reaction has been favorable, depicting the invitation represents one more step towards closer oil relations between Venezuela and the Arab countries.

New Venezuelan Oil Co.

The Ministry of Mines and Hydrocarbons has announced that the long expected national oil company will soon be formed and that it will begin operations immediately. Production can be expected before August 1960 according to the ministry.

Oil Minister Perez Alfonzo stated that the new company is in no way a step towards nationalization of the Venezuelan oil industry, but that it will work instead side by side with the international companies, sharing the same privileges and duties.

The company will start out as a small operation by drilling in proven areas of national reserves and will contact out most of the technical services necessary to make a field produce. Production will be refined by one of the local companies whenever possible, according to the minister.

Labor Situation Difficult

Unemployment in Venezuelan oil is steadily increasing in spite of government efforts to check the firings. Not long ago, the government drew a promise from the oil companies that no workers would be fired in excess of normal turnover. However, hundreds of small contractors are shedding personnel as contracts fail to materialize. Most contractors refused to abide by the collective labor contract which protects the workers from "seasonal" firings, on the grounds that they can not "possibly survive" if forced to maintain excess personnel.

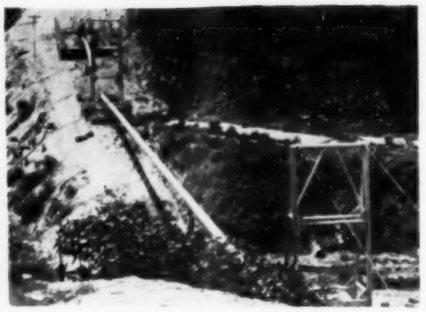
The oil workers union is preparing demands for the collective contract discussion scheduled for November. Among terms related to the rise in the cost of living and increased fringe benefits is a clause demanding the total elimination of contracting and subcontracting practices in the oil industry. The workers blame contractors for mass firings at the termination of contracts.

Venezuelan Purchase By Franklin

Franklin Supply of Denver, Colorado, has purchased Petroleum Industry Consultants C.A. (PETICON) from Servicios Hydrocarb. C.A. of Caracas. The company will become a wholly owned subsidiary of Franklin Supply Co. and will operate as the Peticon Division. Peticon is a South American pioneer in supplying petroleum equipment, with warehouses at Maracaibo, Anaco and Barinas, as well as offices in Caracas.

Venezuelan-Bolivia Oil Agreement

The signature of an agreement with Bolivia for commercial trade has been recently approved by the National Congress. Under the conditions of the treaty Venezuela will send Bolivia fuel oil for use by national railroads, and will receive payment in Bolivian lead and possibly other metals also. The Venezuelan government is studying possibilities of doing the same thing with other countries.



Petrogas C.A., a pipe line construction company, has formally turned over to the Venezuelan government the completed main section of a gas line from Anaco to Caracas, some 330 kilometers of 26-inch pipe. Shown in the photograph is a suspension bridge crossing of the El Valle river in La Mariposa.

"Red" Adair In Venezuela

Firefighter "Red" Adair was back in Venezuela in August to put out a fire on Socony's Anaco field in Anzoategui State. Exploratory well Mata 22 blew up catching on fire threatening to spread out of control. Adair was urgently called and in less than 36 hours the fire was put out.

"Red" Adair makes an average of eight trips to Venezuela every year to answer emergency fire or explosion calls.

Venezuelan Find By Sun

Venezuelan Sun has extended again its Lake Maracaibo discovery with completion of its 30th producing well a considerable distance to the south in Block No. 1 oil concession. The concession is held by Venezuelan Sun Oil Co., Venezuelan Atlantic Refining Co., and Texaco-Seaboard Inc. Venezuelan Sun operates the concession for the group.

The new well, SVSX-32, "was completed as a dual producer testing over 8,200 barrels of oil per day from two zones of the prolific Eocene sands from depths between 8,750 feet and 9,400 feet. It flowed 4,380 barrels per day from the upper zone and 3,820 from the lower zone, both through $\frac{5}{8}$-inch chokes."

Venezuelan Sun first discovered oil on Block No. 1 in mid-1957. Since then, 30 wells drilled on the concession have been completed as oil producers. No dry holes have been drilled. The new outpost "increases to a great extent, the concession's oil potential."

Creole Grant To Armour

The Creole Foundation has announced a three-year grant totaling $75,000 to Armour Research Foundation of the Illinois Institute of Technology to provide technical assistance for the organization and supervision of a building materials research laboratory in Venezuela.

The building materials field was selected by the foundation because of its urgent problems and the fact that suitable equipment was made available by local industries in Venezuela.

Atlantic's Reserves Up

Major discoveries in Venezuela have given Atlantic Refining Co. the potential of crude oil self-sufficiency, Henderson Supplee Jr., president of the company said recently. He pointed out that enough oil has already been found in the Lake Maracaibo area, plus further drilling and handling facilities elsewhere, to meet the company's refinery requirements. He said that reserves so far found in the Lake Maracaibo field are mainly responsible for more than sevenfold increase in the estimate of Atlantic's foreign crude oil reserves during the last four year period.

Creole Reports Lower Earnings

Creole Petroleum Corp. has announced net earnings for the first half of 1959 totalling $115,500,000, roughly amounting to $1.49 per share. During the same period last year Creole reported profits of $160,900,000, or $45,400,000 higher. Average production of the company for the January-June period was of 1,181,243 b/d. During the same period last year the company produced an average of 1,32,072 per day.

The company also reported a combined total of oil refined at the Caripito and Amuay installations of 358,533 b/d. Last year's average for the same period was some 50,000 b/d. lower. Creole showed a decrease in the amount of capital investments of $38,600,000 from last year's investment of $82,000,000 during the first semester. (This year's investment for the first half amounted to $43,400,000).

Venezuela's Hydrocarbons Budget

Venezuela's allotment for the Ministry of Mines and Hydrocarbons in the 1959-60 budget is $170,111,747 plus an additional budget yet to be approved of $21,786,000, making a grand total of $191,897,747. (Approximately US $60 million).

Helmerich & Payne Expands

Helmerich & Payne, Inc., Tulsa, Oklahoma, has announced the acquisition by its Venezuelan subsidiary of International Drilling Co., Inc., C. A. a company which operates four shallow drilling and workover rigs in Eastern Venezuela. All of the rigs are Cardwell models with less than three years in the field. H. & P., C. A. operates eight drilling rigs in the oil regions of Eastern and Central Venezuela in addition to the workover equipment.

Venezuelan Wildcat Find

A wildcat well which opens a new production area in the state of Monagas (eastern Venezuela) was completed recently by Sinclair Venezuelan Oil Co. The well, known as No. 1 East Aguasay, is located eight miles east of the company's nearest producing well in the important Aguasay field discovered by Sinclair in 1957. In a production test the new well flowed high gravity crude at a rate of more than 1,200 b/d from producing zones at 12,474 to 12,495 ft and at 12,617 to 12,652 ft. A second well will be drilled about three miles east, Sinclair announced.

Venezuelan Production Up

Venezuelan crude oil production has risen 11.5% in the first seven months of 1959 over the same period last year, from an average of 2,513,242 b/d to 2,802,889 b/d.

Drilling At Paria Speeded

Two large drilling barges have recently arrived from Galveston, Texas for operations in the Paria Gulf in Northeastern Venezuela. One of the barges is especially equipped for directional drilling with a capacity of 27 wells. The equipment was designed and built by Brown and Root Machine Operators of Houston for Paria Operations, Inc. of Venezuela.

New Appointments

JESUS MARQUEZ GUTIERREZ, Venezuelan economist and oil specialist has been appointed oil adviser to the Venezuelan embassy in Cairo. Oil Minister Dr. J. P. Perez Alfonzo, said the appointment of Marquez was one of the government's first steps towards carrying out the "closer oil relations" policy announced during the Arab Oil Conference. Marquez Gutierrez will work out the attendance of Venezuelan representatives at the next conference of Middle East oil producers.

DR. JOSE ANTONIO GIACOPINI ZÁRRAGA has been named a director of the Compania Shell de Venezuela. Dr. Giacopini, an assistant to Shell's president will now hold both positions simultaneously. The new director joined Shell on April 1949 as director of public relations until two years ago when he was appointed assistant to the president. Recently, Dr. Giacopini attended the Cairo Oil Conference representing the company as an observer.

CHARLES LEET has resigned from the board of directors of Creole Petroleum Corp. according to an announcement of the company. He has been a director since January 1956. Before joining Creole, Mr. Leet was manager of refining activities of Esso Standard Oil Co.

NATURE'S CATALYSTS (2)

The First Catalytic Reaction

The first reproducible catalytic reaction to be carried out was the process of wine making. Vinous fermentation is a natural phenomenon brought about by the catalytic action of the enzyme zymase, which is present in the yeasts found on the skins of all grapes. Viticulture and wine making were practised in the Ægean in the early Bronze Age, and the same basic methods are still in use throughout the world today.

In contrast, methods used in the modern chemical industry are changing rapidly under the influence of continuous developments in catalysis. And the research laboratories of I.C.I. are playing a prominent part in both fundamental work on the properties of materials in the solid state and the practical development of new and improved catalysts.

Full information on I.C.I. CATALYSTS *is available on request:*

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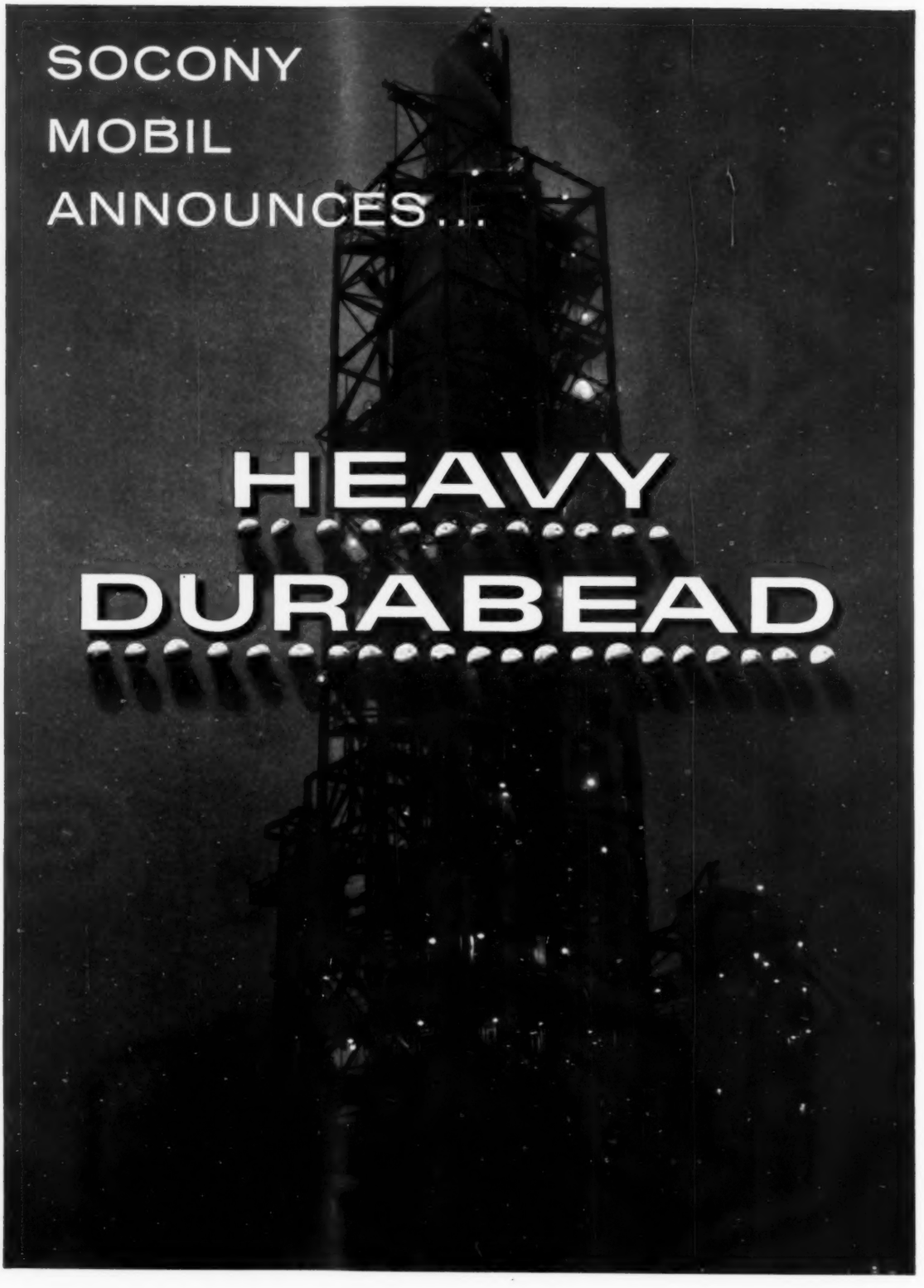
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NOW SOCONY MOBIL'S CATALYST RESEARCH BRINGS YOU:

Lower operating costs
Greater cracking capacity
Reduced construction costs

For years Socony Mobil's scientists have been leaders in catalyst research and engineering. In 1943 they put the first Thermofor Catalytic Cracker on stream. Under wartime pressure they originated and perfected for commercial use the first bead catalyst. With the war over, Socony Mobil researchers continued to improve catalytic refining. By 1950, the Airlift TCC was an accomplished fact. Then in 1957 came Durabead, a bead catalyst that reduced cracking costs, increased refinery efficiency.

Now Socony Mobil catalyst research brings the petroleum industry another important advance—Heavy Durabead!

This new bead catalyst offers all of the advantages of Durabead—plus important new ones. It makes possible construction of TCC units at a 20% reduction in cost. Used in present TCC units, it increases reactor and regenerator capacities as much as 50% compared to chrome bead catalyst.

Once again Socony Mobil leads the way in producing a higher yield of salable products from a barrel of oil—making possible more profit for TCC licensees and operators of other moving bed cat crackers.

To learn more about Heavy Durabead, contact:

Process Promotion Department
Socony Mobil Oil Company, Inc.
150 East 42nd Street
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Leader in catalyst research **Mobil**

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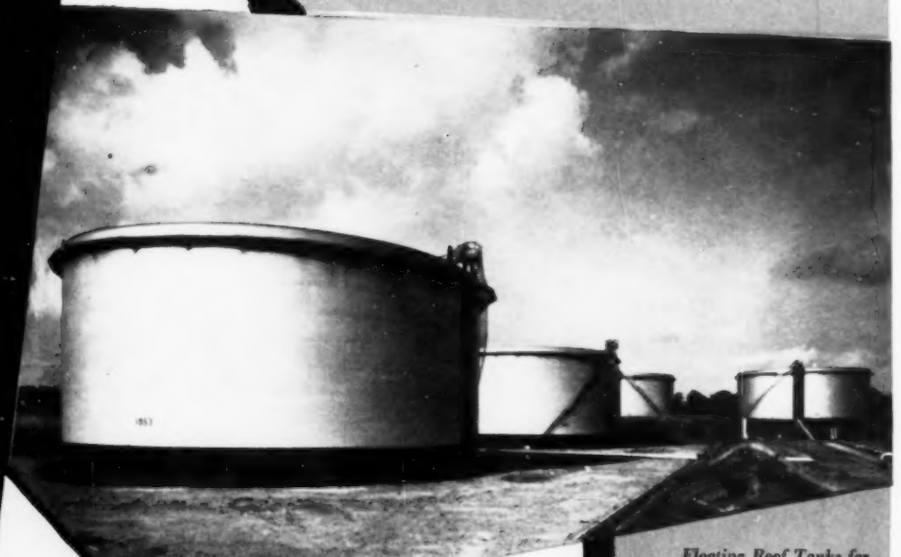
FOR THE OIL INDUSTRY



Floating Roof Tanks for the storage of gasoline at Stanlow Refinery, Cheshire. (By courtesy of Shell Refining Co. Ltd.)

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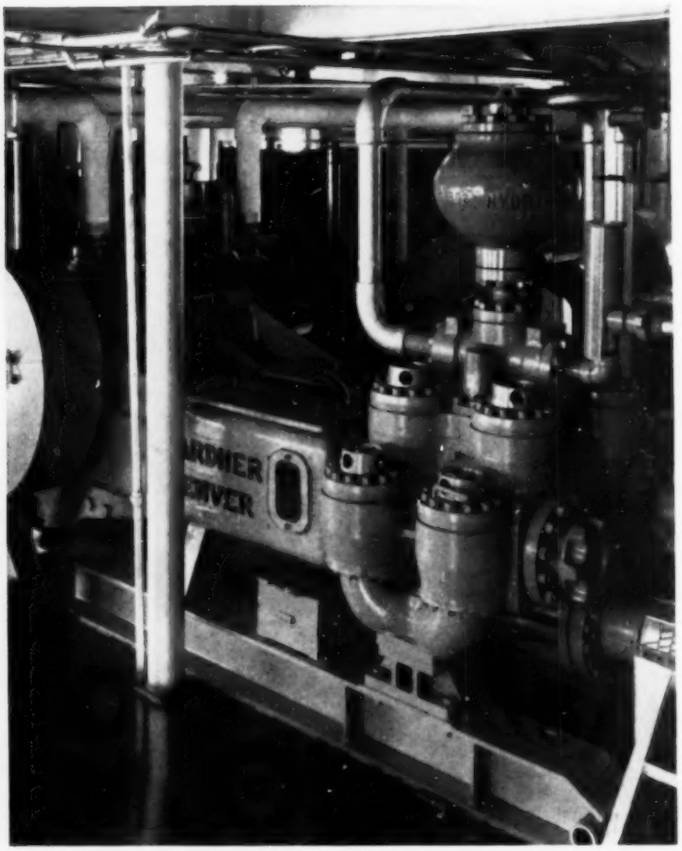

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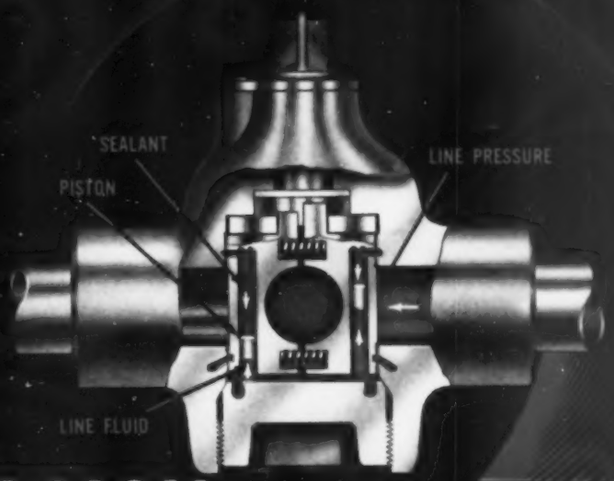

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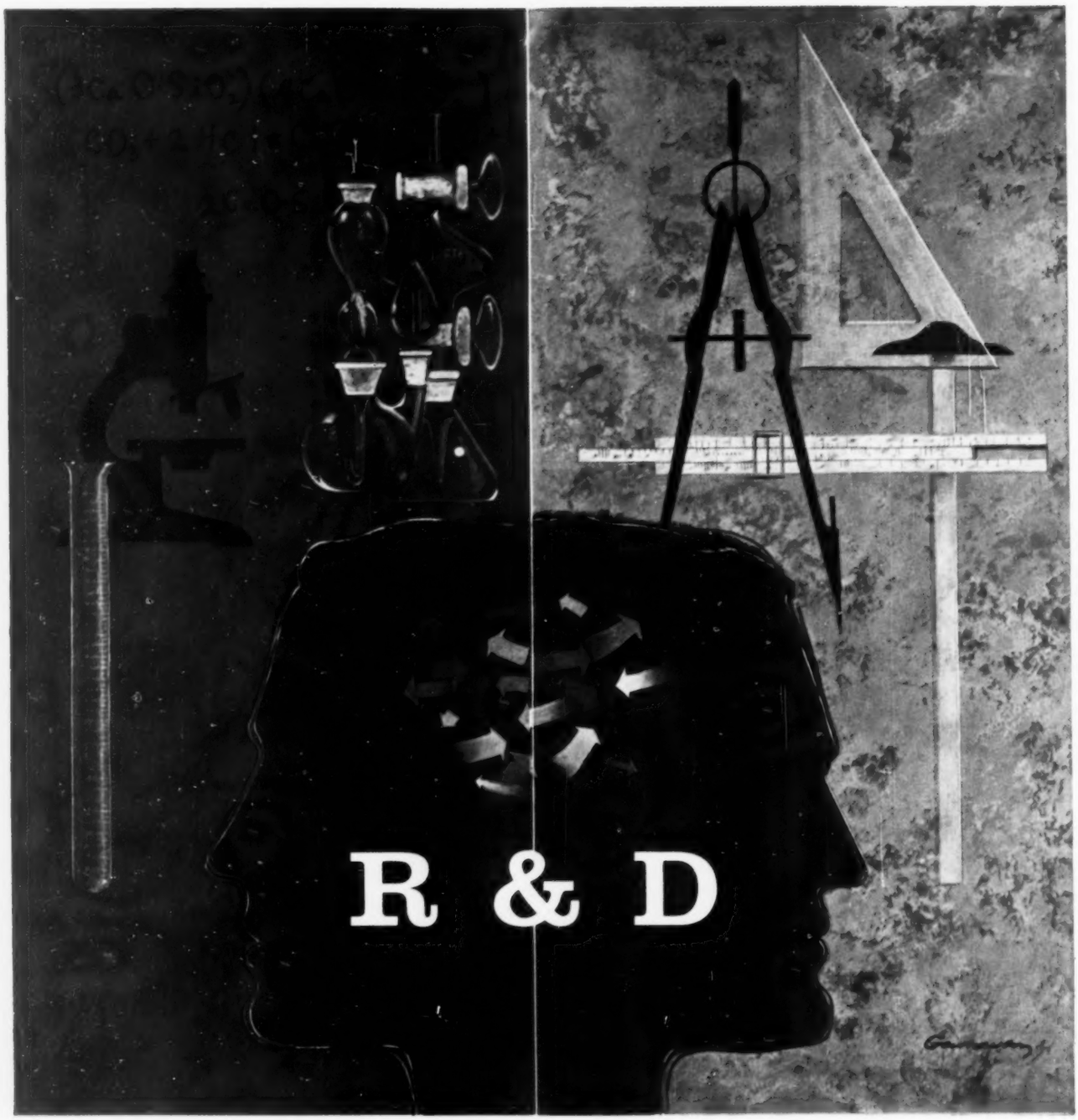

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An Irresponsible Attack

Seven years ago the Caltex group of companies made final deliveries of petroleum to European destinations under the so-called Marshall Plan. The deliveries had hardly been completed before the Economic Cooperation Administration complained of overcharges. Caltex was accused of bad faith and the petroleum industry came in for a vast amount of unfavorable publicity.

A few weeks ago the final chapter was written as far as the legal controversy is concerned. The prices charged were upheld by the United States Circuit Court of Appeals and the government claims denied. How much longer the adverse effects will continue on public attitudes toward the oil industry is not clear.

Certainly the oil companies have not obtained adequate publicity equal in any sense to the headlines created by the original irresponsible accusations. It is not "hot news" when a panel of three judges hands down a 20-page decision reviewing a 7-year-old case and concluding finally that the government's position was untenable. The court said: "In conclusion the important issue to be resolved aside from all technicalities of law and fact is: Was improper advantage taken of the government by the defendants in their ECA-financed sales? If so, every effort should be made to require reimbursement. After a careful review of the record, the conduct of the parties themselves, their own approaches to the problems then facing them and their own contemporaneous interpretations of the Regulations, the conclusion is clear, as succinctly summarized by the trial court, that the defendants' proof showed beyond contradiction that the prices financed by ECA were in fact the lowest competitive market prices. The fact that throughout the entire period ECA continued to finance at such prices, which perhaps more than anything else indicates ECA's acknowledgment that the prices charged were in fact the lowest competitive market prices, gives additional assurance that the payments made were proper. The constant activity of ECA, aided by its own independent experts in keeping informed of the various crude oil prices throughout the world was the government's best guaranty against any overreaching, intentional or inadvertent. The proof here presented reveals that ECA performed its function well.

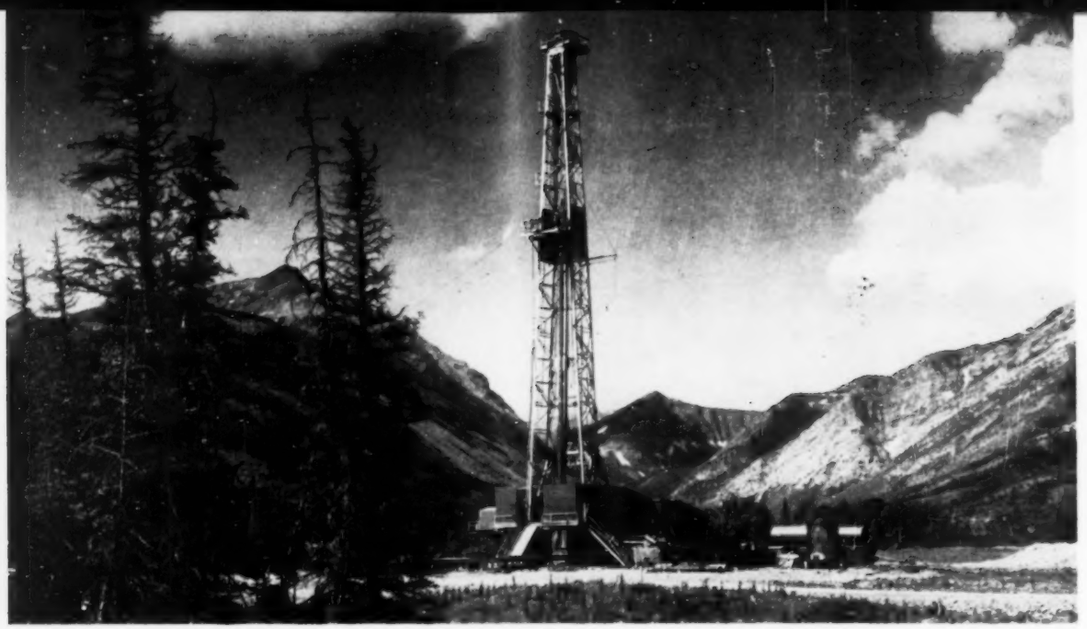
"The judgment is affirmed."

The whole story would be amusing were it not such a serious matter both from the standpoint of cost to the Caltex companies and the damage to public relations of the industry. The government tactics involved a blanket indictment at the start. In reviewing the case the three-judge court commented that "Searching for some one or more theories of liability which may prove to be legally sufficient and factually supported, the government has industriously and *imaginatively* (the italics are ours) pursued every possibility and clue." Even the amount claimed is preposterous. The government first asked all its money back, a sum totaling $66 million. At the same time it told the court that if it couldn't have that much it still would like a refund of $16.47 million.

Falsification of certificates was charged at one time but when the case finally came to trial in the U.S. District Court two years ago the government specifically abandoned its allegations of fraud and deceit. What the case finally boiled down to was that The Texas Co. (now Texaco Inc.) which has an interest in Caltex, sold some crude to a Canadian subsidiary at prices which would net back lower than Caltex was selling at in Europe. The government wanted all European sales to be based back on a few isolated sales for Montreal delivery.

Commenting on the government viewpoint the appeals court pointed out that the ECA figured the fob price at Ras Tanura as low as 8 cents per barrel and at Sidon as low as 28 cents per barrel. "Against these fictitious prices, artificially calculated," the court said, "were the actual prices set in the competitive market of the Eastern Hemisphere of $1.75 and $2.41. The government does not state whether it claims that 8 cents a barrel fob Ras Tanura would be a realistic price. In contrast with the volume of oil being sold under competitive conditions in the Eastern Hemisphere by some of the world's largest oil companies, it would be highly unreasonable to accept a few cif sales in Canada as fixing either the locale of the 'market' or the 'lowest competitive price' in the Eastern Hemisphere." At another point the court said that "The government not only failed to prove that there was an established 'market' or 'market price' in Canada but advanced no possible basis for assuming that a 'competitive market price' for fixing the competitive price of the vast volume of Middle East oil could be found in the three or four isolated Western Hemisphere sales by Texaco."

The Caltex group of companies including the parent Standard Oil Co. of California and Texaco Inc. may well take satisfaction from the complete vindication of their position by the U.S. District Court and by the Court of Appeals. The case should have the effect of causing government officials not to embark on tedious and protracted litigation on the basis of half-baked theories and at great expense to both the government and to the seller. If government suppliers must be exposed to public villification and to great expense in defending its price quotations it will not be surprising if bidders are fewer and prices are higher to compensate for the possible risks.



Shell Oil well in Alberta

Borden Report draws fire in Canada

Raise production 200,000 b/d by end 1960 or get set for a Montreal pipeline. That sums up the Report's recommendations which follow closely basic conclusions by consultant Walter J. Levy.

THE happiest man in Canada today is Henry Borden, chairman of the Royal Commission on Energy. His Commission has issued its second and final report, dealing with the problems of Canada's young and restless oil producing industry. Now the thankless and difficult job is over; he can sit back and do nothing but dodge brickbats that are already in the air.

The Commission's first report dealt with gas. The second report deals mainly with crude oil and says, in effect, that the crude producing segment of the industry must get busy and raise production to 700,000 b/d by the end of 1960 "or else." Presuming that Canadian consumption will increase its expected 6% yearly, about 35,000 b/d, and since production is now about 500,000 b/d, this would mean that an increase of around 130,000 b/d remains to be swapped out "or else." The "or else" is the Montreal-Western Canada crude pipeline, a project that would cost half a billion dollars and tie up Canada's foreign policy for decades.

Most vocal in their protests are the big producing companies with refining interests in Montreal. One company head termed the Report's deadline of 700,000 b/d by 1960 "improper." He said that the Montreal market was uneconomic, a pipeline there wouldn't solve anything. Even within the Commission there was strong opposition. G. E. Britnell, one of the six Commission members, filed a long Memorandum of Reservation which, in the opinion of some industry members, was the best thing about the report. He was partially concurred with in two similar memoranda filed by Commissioners Howland and Hardy.

In essence, the report follows the recommendations of Walter J. Levy, an economic consultant on petroleum, who wrote a comprehensive report for a group of independent companies in Calgary last year, and who testified before the royal commission during its hearings. He saw it as an intermediate and a long range problem. The intermediate problem is to elevate Canadian production levels right away, using existing facilities. The long term problem is to keep them up, and to ensure normal expansion in the years ahead. The immediate increase could be achieved by means of "swaps," Mr. Levy reported, where Montreal refiners who have affiliates or connections on the West Coast of the United States could arrange for Canadian crude to be used there while they used crude imported from Venezuela or the Middle East. The second aspect, the long-range problem, could best be solved by building an export market in the United States, the natural economic destination for Canadian crudes. Failing that, domestic Canadian solutions would have to be found, namely a penetration of the Montreal market.

That, in effect, was what the report said. The production of 700,000 b/d by the end of 1960 was set up as the immediate goal for the industry to achieve. The carrot (or the club) that is to serve as the industry's incentive to conclude intercompany agreements and swaps to achieve this level is the Montreal pipeline. If the level is not achieved as specified then the commission recommends import licensing—and that would open the way for the major crude line from Alberta to Montreal.

Proceeded by an impressive documentation on reserves of oil and gas, production, exports and future markets including Montreal, the commission concluded that there exist adequate reserves of natural gas and crude and that export licenses would not be required for crude oil in the future. It further concluded that in view of Alberta's production being shut in for lack of markets and being held to about one-third of its productive capacity, markets must be immediately improved if Canada's oil industry is to be saved. The limitations of the Montreal market were recognized, especially the reluctance of refiners there to enter into any agreement to accept Western Canada's crude when some future competitor might enter not bound by such an agreement and undercut them with imported oil. The report ruled out the possibility of immediate government action to shut out such imports and make the market available for the pipeline.

With respect to shut-in production, the report compared the United States and Canadian situations. The industry in Canada during 1948 was only using 47% of its potential production, the lowest percentage of any country in the world, while the United States was using about 72%. Noting that Canadian production was only economic when related to North American markets, the report then reviewed the potential ways of increasing markets.

Vancouver refineries are now supplied by Canadian crude because of the refiner's affiliations with the Trans Mountain pipeline system, but the market could be invaded by other refiners without such affiliations

and using foreign crude. The Ontario refineries are mostly supplyed by Canadian crude and such refined products (around 59,000 bbls/day) that now move west from Montreal via the Trans Northern products line are to be replaced by 1962 with Canadian crudes refined in Ontario. This will add about 50,000 b/d to Canadian crude markets in Ontario refineries. This is presuming the price cuts abroad and the new St. Lawrence Seaway will not enable imported oil to cut into this market. This, using Imperial Oil estimates, would make the market for Canadian crude in Canada about 490,000 b/d in 1960, compared with a productive capacity of around 1,157,000 b/d in that year. If the Montreal pipeline were completed the market would be in the neighborhood of 700,000 b/d in 1960, without exports.

The United States market is the only economically-justifiable market for Canadian crude, according to the report. Under the exemption of June 1, 1959, all crude moving into the United States by pipeline, motor vehicle or rail is exempt from the import limitations. This affords the opportunity to increase Canadian exports to the United States, particularly to the Pacific Northwest since there are pipeline facilities to service that area already in existence whereas the increase of exports to the Middle West area would necessitate additional pipeline facilities and refinery extensions which would call for large new investments. The market in the entire northern United States from the West coast to the Great Lakes is about 1,500,000 b/d.

The Commission feels, therefore, that the initiative in this case is up to the oil companies themselves to "pursue . . . a vigorous policy of promoting the export of Canadian crude oil into these and other areas so that Canadian crude can establish itself as a continuing source of supply in United States markets in sufficient volume to enable the industry in Canada to expand and maintain a high level of production." The Committee concluded, further, that such action combined with an "effective national policy ensuring the use of Canadian crude in domestic markets, now accessible by pipeline and, encouraging the use in those markets of products refined from Canadian crude" would permit production at a high enough level and provide incentive for exploration and development.

The target production was fixed at 700,000 bbls/day in 1960. The commission further stated that if this level is reached by the end of 1960, and thereafter normal market growth and an aggressive search for export markets is kept up, that it would be "neither necessary nor desirable to take action to secure the Montreal refining area as an outlet for Canadian crude." In other words, the pipeline would not then receive government support.

The conclusions learned very pointedly on the "international associations" of most of the Montreal refiners and of the producers in western Canada. In the past year there has been a sharp controversy raging in Calgary, with the independent companies maintaining the pipeline would be the best thing for Canada and claiming that the international companies producing in Western Canada were not supporting the pipeline because it would back out imports by their affiliates in Venezuela and the Middle East into eastern Canada. The commission, while not expressing this view, pointed out that such Montreal refiners would be prepared to "work out private commercial arrangements with their supplier or affiliated companies or with other companies to offset their imports of foreign crude by exports to United States markets." Some have already done so, but it was urged that these be increased and that refiners who have not made such arrangements make them. The quantities involved should depend on imports, crude resources in Canada and connections with United States oil and refining companies.

In order to ensure the maximum possible use of Canadian crude, the report concluded, a system of licensing of imports of crude oil might have to be put into effect, denying license where facilities exist already for use of Canadian crude. It would not be used for areas where Canadian crude could not be used, such as the maritime provinces. Neither would it be used against United States exports of crude into Canada which are insignificant in any case, averaging only 1.3% of total Canadian imports in 1958. This same licensing system would "lay the foundation for the building of pipeline facilities to transport Canadian crude to Montreal, when and if it becomes necessary." No need for licensing of imports of products was foreseen.

The Commission's report concludes with the statement that authorities of each producing province should be "urged to keep their policies and regulations concerning exploration and development under constant review, in order that development may proceed in as orderly a manner as possible in relation to available markets for Canadian crude." This statement was evidently designed to lessen the usual prodding that provincial governments give exploring companies to drill and prove up reserves.

Inter-Commission Objections Filed. Several members of the commission filed reservations to the report, especially Commissioner G. E. Britnell. He objected to the report's tendency to view the prospects of the oil-producing industry in "terms more gloomy than the circumstances warrant" and to assume that government intervention should be used to protect the industry through, ultimately, import restrictions, thereby causing problems more serious than those existing at present. He views the temporary depression of the industry as just that, a temporary condition, and the comparison of actual production to potential production as an normal situation for a new industry. Although provincial legislation has tended to force the pace of development without regard to markets, the expected growth in Canadian oil markets as foreseen by the industry without implementing any of the report's recommendations will ensure a substantial growth in the ratio of production to producibility.

Another fact pointed out by Mr. Britnell is that in normal circumstances the oil industry would make more money concentrating on markets already served by it in Canada and in the US than it would if its efforts were directed to Montreal. To lay Canadian crude down in Montreal would entail a substantial cost reduction, or a full-fledged system of protection, or both.

Still another point of difference in Mr. Britnell's memorandum of reservations is in his feeling that the overwhelming concern of the report with need for a rapid improvement by 1960 or 1961, rather than with the long-term prospects of the industry, is unwarranted. He then reverts again to his contention that the Canadian industry must find continuously expanding markets in the United States and that such expansion can only be realized if forces making for efficient and low-cost production are permitted to operate.

He points out that comparison of Canada's

(Continued on page 80)

SUMMARY OF BORDEN COMMISSION RECOMMENDATIONS

(1) That it be national policy

(a) to encourage and permit the export of Canadian crude oil without license, and

(b) to ensure the continued use, consistent with the interests of the Canadian consumer of petroleum products, of Canadian crude in refinery areas of Canada accessible to it by existing pipe line facilities, thereby increasing the market outlets for such crude oil.

(2) That to implement such national policy the oil companies concerned take steps as soon as possible to displace, with products refined from Canadian crude, a volume of petroleum products now moving into the Ontario market from the Montreal refinery area equivalent to approximately 50,000 b/d of crude oil.

(3) That to implement further such national policy the Canadian oil industry take vigorous and imaginative action very substantially to enlarge its markets in the United States on a basis that will ensure the continuing participation of Canadian crude in these markets and in their expansion.

(4) That no government action should at this time be taken to ensure the construction of pipe line facilities to transport Canadian crude oil to the Montreal refinery area and that before any such action is taken an opportunity be given to the oil industry to demonstrate that it can find markets elsewhere in Canada and the United States sufficient to sustain a healthy and vigorous Canadian oil industry with the incentive for further exploration and development.

(5) That, if government action should become necessary to implement the national policy we have recommended above, imports of crude oil made subject to license and that such licenses be denied (except for some good and sufficient reason) to refiners in a refinery area in Canada where adequate pipe line facilities exist for the transportation of Canadian crude oil to meet the demands of such refinery area, but that crude oil imported through a pipe line or by motor carrier or rail and produced in the country from which such cude oil is imported be exempted from such licensing.

Great Britain's biggest tanker, the British Queen, was launched September 16 from John Brown and Co.'s Clydeside yards. With a capacity of nearly 50,000 ton of crude, a length of 760 ft, breadth of 97 ft, she has a loaded speed of 15.5 knots. To go into service on the Persian Gulf-UK run next year, she is the first of twelve 50,000 dwt tankers on order for BP Tanker Co, which also has seven 65,000 tonners on order.

WORLD TANKER FLEET: 1959 TO 1963

- Up 14.3% over last year
- Outlook for 1963—up 44%
- Supertankers retain dominance
- Liberian flag holds leadership

THE world tanker situation today continues to be one of steady though somewhat slower growth, and with certain shifts in positions of leadership among national flag fleets.

At the start of this year, the world fleet—3,146 ships, 56,640,700 deadweight tons, and 3,403.2 T-2 equivalents—had risen in carrying capacity by 14.3% over a year ago, and showed a five-year gain of almost 70%.

Forecasts for 1963—five years hence—ranged from 3,946 to 4,810 total T-2 equivalents, representing increases of 25 to 44% over 1959. These variations resulted from differences in basic assumptions on which the forecasts were based.

Highlights of the latest analysis of the world fleet, from Sun Oil's series of annual tanker studies, were these:

(1) During 1958, 245 tank ships were delivered with a total carrying capacity of 455.4 T-2 equivalents (a T-2 equivalent represents a vessel of 16,765 dwt and capable of a speed of 14.5 knots).

This was the highest number of T-2 equivalents ever delivered in a single year. Almost 60% of this carrying capacity was registered under the flags of Liberia, Norway, and the United Kingdom. United States flag owners received 31.8 T-2 equivalents, the largest amount of carrying capacity delivered to the USA in any one year since the end of World War II.

(2) Liberia occupied the top position at the end of 1958, with respect to flag of registry. The USA was second, followed by Norway, the United Kingdom, and Panama. Five years ago, the USA had ranked first and Liberia had been fifth.

(3) Supertankers (24,000 dwt and over) continued to rise in number. They accounted for approximately 37% of the total carrying capacity of the world fleet as of December 31, 1958, compared with slightly over 31%

TABLE 1—WORLD TANKER FLEET, 2,000 GROSS TONS AND OVER
(as of December 31, 1958)

Flag	No. of Ships	T-2 Equivalents Number	T-2 Equivalents % of World
Liberia [1]	417	700.1	20.6
USA [2]	474	529.5	15.6
Norway	476	502.1	14.8
United Kingdom	556	493.2	14.5
Panama [3]	195	232.4	6.8
France	122	150.0	4.4
Italy	128	133.3	3.9
Sweden	119	129.6	3.8
Netherlands	124	108.8	3.2
Japan	88	102.9	3.0
Denmark	59	64.9	1.9
Germany (West)	44	45.6	1.3
USSR	58	28.6	0.9
Argentina	43	24.4	0.7
Spain	39	21.6	0.6
Greece	25	19.0	0.6
Brazil	16	14.5	0.4
Belgium	12	14.4	0.4
Finland	14	11.7	0.4
Venezuela	29	10.7	0.3
Canada	11	9.0	0.3
Portugal	10	8.5	0.3
Mexico	19	8.2	0.3
Turkey	7	4.8	0.1
China	5	4.4	0.1
Poland	7	3.7	0.1
Saudi Arabia	1	3.2	0.1
Union of So. Africa	2	2.4	0.1
Yugoslavia	5	2.3	0.1
Israel	3	2.3	0.1
Uruguay	3	2.1	0.1
Egypt (UAR)	3	1.8	0.1
Ireland	2	1.3	0.0
India	2	1.2	0.0
Germany (East)	2	1.2	0.0
Chile	2	1.2	0.0
Iceland	1	0.9	0.0
Australia	1	0.9	0.0
Korea	4	0.8	0.0
Peru	3	0.6	0.0
Honduras	1	0.6	0.0
Indonesia	2	0.5	0.0
Costa Rica	1	0.5	0.0
Pakistan	1	0.4	0.0
Colombia	1	0.2	0.0
New Zealand	1	0.2	0.0
Dominican Republic	1	0.1	0.0
Misc. Colonies	7	2.7	0.1
Totals	3,146	3,403.3	100.0

[1] Under U.S. control; Ships—180; T-2 equivalents—332.9; % of World—9.8.

[2] Includes government ships.

[3] Under U.S. control; Ships—131; T-2 equivalents—164.2; % of World—4.8.

Note: Total U.S. control, all flags; ships—947; T-2 equivalents—1,198.2; % of World—35.2.

The world's largest merchant ship, the Universe Apollo, carried 780,000 bbl of Gulf Oil Co. Kuwait crude to Tokuyama, Japan, on her maiden voyage in March. Built in Japan, the 106,416 dwt tanker has an overall length of 950 ft, a breadth of 135 ft, fully loaded draft of 48 ft 3 in., speed of 15.5 knots, and cruising range of 27,000 miles.

AVERAGE CARRYING CAPACITY
OF TANK SHIP FLEETS OF MAJOR FLAGS

OCEAN-GOING VESSELS 2,000 GROSS TONS AND OVER

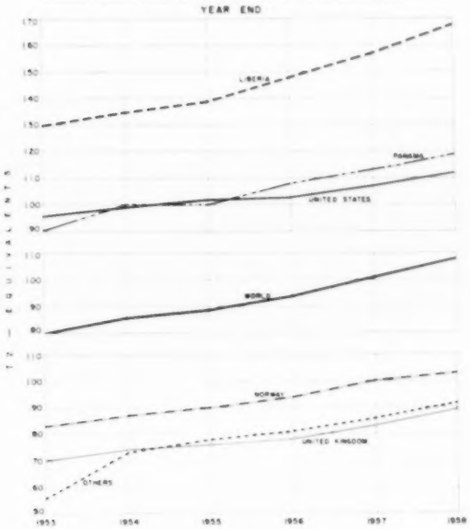


Fig. 1 Source: Sun Oil Co.

a year earlier, and only some 13% five years ago.

Over two-thirds of the Liberian carrying capacity was represented by supertankers, and Panama was next with about 44% in the most recent tabulations.

(4) Ownership has been shifting gradually over the past five years from the oil companies and governments to non-oil companies. In the U.S. fleet, both non-oil companies and the government have gained over oil company ownership. USA owners continued to register their tankers during 1958 under foreign flags as opposed to registry under their own flag. At the end of 1958, 55% of the total USA controlled fleet were of foreign registry compared to 51% in 1957 and 34% in 1953. Two of the so-called "flags of convenience," Liberia and Panama, were the leading foreign registries with respect to USA controlled tonnage at the end of 1958.

TABLE 2—TRENDS IN WORLD TANKER FLEET OWNERSHIP
(Ocean Going Vessels 2,000 Gross Tons and Over)

Flag	Dec. 31, 1953 T-2 Equiv.	Dec. 31, 1953 % of World	Dec. 31, 1957 T-2 Equiv.	Dec. 31, 1957 % of World	Dec. 31, 1958 T-2 Equiv.	Dec. 31, 1958 % of World	% Change from 1953	% Change from 1957
Liberia	125.9	6.3	545.3	18.3	700.1	20.6	456.1	28.4
USA	525.3	26.2	503.1	16.9	529.5	15.6	0.8	5.2
Norway	293.9	14.6	439.2	14.7	502.1	14.8	70.8	14.3
United Kingdom	360.5	17.9	455.0	15.3	493.2	14.5	36.8	8.4
Panama	196.9	9.8	204.8	6.9	232.4	6.8	18.0	13.5
France	76.0	3.8	125.5	4.2	150.0	4.4	97.4	19.9
Italy	75.8	3.8	117.4	4.0	133.3	3.9	75.9	13.5
Sweden	68.5	3.4	122.1	4.1	129.6	3.8	89.2	26.9
Netherlands	46.2	2.3	98.1	3.3	108.8	3.2	135.5	10.9
Japan	49.9	2.5	86.5	2.9	102.9	3.0	106.2	19.0
Other	187.6	9.4	279.5	9.4	321.4	9.4	7.2	15.0
Totals	2,003.5	100.0	2,976.5	100.0	3,403.3	100.0	69.9	14.3

(5) As of the start of this year, 803 tankers of approximately 28.5 million deadweight tons (dwt) were on order or under construction. Shipyards in Japan, Britain, Sweden, and Germany account for 60% of the total tonnage. Almost half of the construction and orders were intended for registries of the United Kingdom, Liberia, and Norway. Known construction and orders have been dropping since the end of the third quarter of 1957. Tonnage being built has decreased from the 38.8 million dwt at that time to a level of 26.4 million dwt at the end of March, 1959. This trend has been attributed to the tanker surplus that developed after the Suez was reopened early in 1957.

(6) In addition to the overall increase in the world fleet anticipated for 1963, a number of important positional changes can be

Fig. 2 Source: Atlantic Refining Co.

COMMERCIAL PETROLEUM TANKER SUPPLY
1959-1963

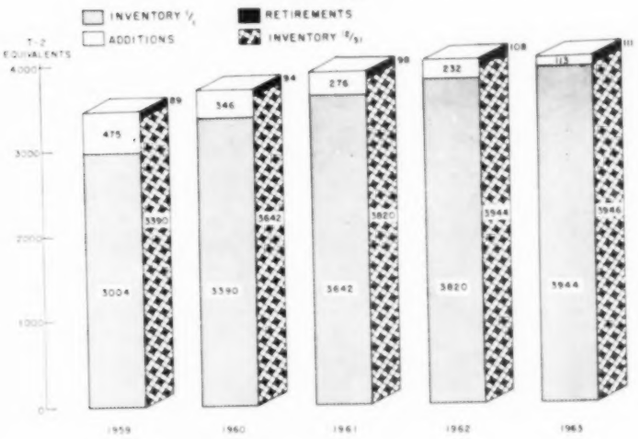
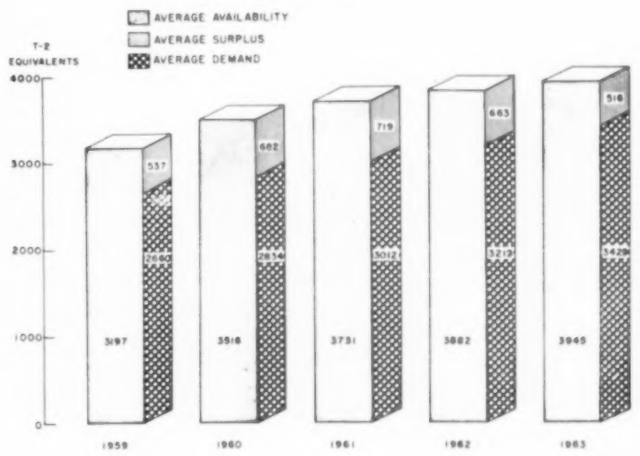


Fig. 3 Source: Atlantic Refining Co.

COMMERCIAL PETROLEUM
TANKER SUPPLY & DEMAND
1959-1963



The latest tanker built for Onassis is the Olympic Challenger. This stream-lined ship has a deadweight tonnage of 65,146.

expected, assuming construction and orders at the end of 1958 are added to the existing fleet with an allowance for future scrappage. The United States will decline from second to fourth, while the United Kingdom will climb into the number two spot. All the major tanker-owning nations except the USA will advance relatively more than the total world fleet.

The present tanker surplus will continue to grow during the next three years, but will diminish to some extent during 1962 and 1963, based on today's relatively low tanker charter rates, high lay-ups, and high scrappage. The outlook for the American tanker market is somewhat better than that for others.

TABLE 3—
TANKERS UNDER CONSTRUCTION OR ON ORDER
(As of December 31, 1958)
(Ocean Going Vessels 2,000 Gross Tons and Over)
(Figures in 1,000 Tons)

Intended Flag	Number	dwt	Average dwt
United Kingdom	175	6,151.3	35.2
Liberia	98	4,709.9	48.1
Norway	150	4,486.2	29.9
Panama	45	1,547.8	34.4
France	36	1,544.9	42.9
Sweden	45	1,373.3	30.5
USA	28	1,149.4	41.0
Netherlands	35	1,106.9	31.6
Italy	27	952.7	35.3
Spain	35	712.8	20.4
Germany	15	581.8	38.8
Japan	15	536.9	35.8
Denmark	18	507.4	28.2
Brazil	7	206.3	29.5
Greece	5	201.8	40.4
Others*	69	2,694.1	39.0
Totals	803	28,463.5	35.4

Country of Construction	Number	dwt	Average dwt
Japan	107	5,009.6	46.8
United Kingdom	151	4,830.9	32.0
Sweden	120	4,110.8	34.3
Germany	91	3,472.9	38.2
USA	45	1,956.4	43.5
Netherlands	61	1,884.2	30.9
Norway	56	1,593.8	28.6
France	36	1,597.4	44.4
Italy	42	1,448.2	34.5
Denmark	29	963.3	33.2
Spain	35	712.8	20.4
Belgium	14	425.3	30.4
Yugoslavia	8	191.7	24.0
Canada	2	80.0	40.0
China	2	72.0	36.0
Greece	2	49.0	24.5
Australia	1	32.2	32.2
Portugal	1	27.0	27.0
Total	803	28,463.5	35.4

* Includes 38 vessels of 1,790.6 dwt with intended flag unknown.

(7) A study of tank ship scrappage over the past 37 years shows no independent pattern. Rates appear fundamentally dependent upon the world economic and political conditions which influence demand for tankers.

There is some indication that five factors can be related to explain tanker scrappage rates. In order of degree of association, these are: (1) inactive tankers, (2) steel scrappage prices, (3) size of world fleet, (4) deliveries of tankers, and (5) charter rates.

Pertinent detailed statistics on most of the important changes in the world tanker fleet are given in Tables 1-6 and Fig. 1, which are based on the Sun Oil analysis.

Fleet outlook. As to where the world tanker fleet will be by 1963, two independent forecasts have been developed this year; one in the Sun Oil study and the other by economists with Atlantic Refining Co. for the 1959 Annual Tanker Conference of the American Petroleum Institute's Central Committee on Transportation by Water. Both forecasts predict a healthy growth, but they vary in the extent of growth because of a few differences in basic premises.

A rise to 4,910 T-2 equivalents by 1963 is expected in the Sun Oil study, as shown in Table 7, representing an overall increase of 44% in carrying capacity. The procedure was the same as used in previous analyses: the addition of new construction and orders to the existing fleet with an allowance for future scrappage. The Sun work was carried out under the supervision of James S. Cross, manager, statistical research department.

Inherent in the technique were the following assumptions:

(1) That there will be no fleet additions not now on order, no cancellations of existing orders, no interflag transfers, and no conversion to tankers.

(2) That all vessels which will be 25 years or older five years hence will have been scrapped or converted to other types of ships, and

(3) That two-thirds of the tonnage under construction or on order for which intended flags of registry are not listed will be registered with Liberia when delivered.

It must be pointed out with respect to the first assumption that there is no doubt that additional orders will be delivered within the next five years. This will most likely be true for the USA registry, to which no tankers are scheduled for delivery during 1962 and 1963. Also, a sizeable number of orders have been cancelled in the past two years, and with the current surplus, further cancellations seem plausible. Certainly inter-flag transfers and conversions to tankers can be expected.

The scrappage assumption also needs some qualifications. The average age at the time of scrappage has been significantly higher than 25 years since the end of World War II. However, during 1958, the figure slipped below 25 and indications are that this trend will continue. There are several reasons: first, the present oversupply and trend towards larger vessels will dictate a higher scrappage rate for the older and smaller vessels. Secondly, the age distribution of the present fleet indicates a great portion of ships built during World War II and a small percentage prior to that war. The first group will be 20 years or less at the end of 1963.

TABLE 4—
TRENDS IN WORLD TANKER CONSTRUCTION
(Ships 2,000 Gross Ton and Over, under Construction or on order as of:)

Date	1,000's of dwt
Sept. 30, 1957	38,814
Dec. 31, 1957	37,407
March 31, 1958	34,058
June 30, 1958	31,332
Sept. 30, 1958	29,721
Dec. 31, 1958	28,464
March 31, 1959	26,379

TABLE 5—TRENDS IN TANKER SIZE
Supertankers, 24,000 dwt and over, as of Dec. 31, 1958

Flag	Number	1,000's dwt	T-2	% of Total Flag T-2
USA	67	1,949.6	136.6	25.8
Liberia	187	7,082.4	473.1	67.6
Norway	79	2,286.8	142.4	28.4
Panama	50	1,526.6	102.8	44.2
United Kingdom	70	2,173.3	140.4	28.5
Others	136	4,135.8	272.2	28.8
World 12 31 58	589	19,154.5	1,276.5	37.2
World 12 31 57				31.5
World 12 31 56				24.7
World 12 31 53				13.4

TABLE 6—
TRENDS IN WORLD TANKER OWNERSHIP

As of	Oil Companies	Non Oil Companies	Governments
12 31 53	34.1	55.1	10.8
12 31 54	34.1	55.9	10.0
12 31 55	34.0	55.8	10.2
12 31 56	34.0	56.2	9.8
12 31 57	32.6	58.4	9.0
12 31 58	30.8	61.0	8.2

New U.S. vessel, the Mobil Aero, is a 30,000 dwt tanker built by Sun Shipbuilding & Dry Dock Co. Two tankers of this class were delivered recently to Socony Mobil, and Sun Ship has now under construction two 50,000 tonners.

Regarding the third assumption, past experience has shown that all vessels with unknown flags of registry have been registered with the so-called "flags of convenience," particularly Liberia and Panama with United States control.

The following technique was used for the projection to 1963:

(1) Even though construction data provides speeds for only about half the tankers, the same average speeds have been assumed for the remainder of ships being built so as to express the projection in terms of T-2 equivalents.

(2) Scrappage figures were calculated for both a 25 and a 20 year period, and an average of the two was used.

(3) For the ships being built with unknown flags of registry, two-thirds were apportioned to Liberia and one-third to Panama.

The relative positions of the principal maritime countries by the end of 1963 was based on this procedure and are shown in Table 7.

It must be remembered that all of the present construction for U.S. registry is scheduled for delivery before 1962. If no new orders were placed for 1962-1963 delivery and assuming the indicated scrappage level, USA flag tonnage would be in tight supply by 1962. This assumes an annual growth rate of 4% in U.S. petroleum consumption and the maintenance of some form of import quotas. Thus, there is a strong possibility that USA yards will receive additional orders from USA flag owners for 1962-1963 delivery in the near future. Furthermore, there may be a governmental program to increase USA ship-building activity. Although this leads to the conclusion that the carrying capacity registered with the USA at the end of 1963 will not be as low as shown in the table, it should not significantly change the main findings of the analysis, Sun believes.

A somewhat different outlook for 1963 has been predicted in the study by Atlantic Refining Co.'s D.C. Hamilton, manager, economics department, and J. S. Weatherby, distribution economist. This forecast is confined to the total world fleet situation and covers expected growth figures for each year, as shown in Fig. 2.

For the first four years, new deliveries are estimated to far outweigh requirements, and are therefore the crucial element in the supply picture. In the projections, Atlantic economists used the John I. Jacobs & Co. estimates for 1959. For the remaining four years, the Jacobs' estimates have been arbitrarily reduced by 60 T-2's per year to allow for future cancellations, conversions, and rescheduling of existing orders beyond 1963. If these projections are correct, new deliveries for 1959-63 will fall short of those for the last five years by about 6%.

A rather severe scrappage schedule was assumed—the retirement of all ships over 20 years of age. Atlantic further assumed accelerated obsolescence for 25% of all tankers reaching 16 years of age during this period, or that one out of four war-built ships will be scrapped before taking the fourth survey. In total, the estimates provide for scrapping 500 T-2 equivalents, including roughly 100 upon reaching 16 years of age. By comparison, 225 T-2 equivalents were scrapped or converted during the past five years.

The assumptions used deviate rather sharply from past experience, Atlantic economists point out, because of the combination of such factors as high lay-up, huge order backlog, and fact that many new ships will be cheaper to operate per ton-mile of cargo.

Tanker Market Outlook. Both groups of oil company economists have attempted to answer a question uppermost in the minds of all oil companies and independent tanker owners: How long will the present tanker surplus last? Or put another way: How long will the depressed tanker market last?

In general, both groups have assumed the tanker surplus will continue to grow during the period 1959-1961, and despite some additional deliveries, it will diminish to some extent during 1962 and 1963.

A year-by-year outlook of tanker supply-demand as seen by Atlantic Refining is shown Fig. 3. The key figure in this chart is the difference between demand and supply. A small surplus is normal to care for seasonal requirements. However, the estimated surpluses are far above this, rising from 537 T-2 equivalents this year to a peak of 719 in 1961 and still standing at 516 in 1963.

These estimates are based upon several specific assumptions:

(1) Free world consumption of crude and products will rise 7.5% per year: U.S. consumption will rise 4% per year.

(2) Production in Algeria, Argentina, and Brazil will grow more rapidly than the markets it supplies.

(3) There will be a further increase in Russian shipments to the free world.

(4) Present US import restrictions will continue. However, no provision has been made for hemispheric preference. This would reduce tonnage requirements.

(5) No provision has been made for new pipeline construction, which on balance would probably reduce tonnage needs. However, allowance has been made for announced increases in the capacity of the tapline and IPC systems.

(6) No provision has been made for crude oil to move around the Cape in tankers too large to use the Suez Canal when loaded.

(7) No allowance has been made for use of tankers in grain movements, reduced running speeds, increased idle time, or the general tendency toward greater usage of tankers when rates are very low.

The Atlantic Refining economists emphasized that there is nothing sacred in their estimates, that the important point is their general magnitude. Even if 300 T-2 equivalents were cut from the average annual surpluses shown, the very depressed tanker market suggests that a balanced world-wide tonnage position is still some years away.

The thinking behind the outlook by Sun

TABLE 7—WORLD TANKER FLEET OUTLOOK FOR 1963

Flag	Actual Fleet Dec. 31, 1958 T-2 Equiv.	% of World	Under Const. or on order Dec. 31, 1958* T-2 Equiv.	% of World	Scrappage 1959-1963 T-2 Equiv.	1963 Fleet Outlook** T-2 Equiv.	% of World	Net Change 1959-1963 %
Liberia	700.1	20.6	401.1	22.9	26.3	1,074.9	21.9	53.5
United Kingdom	493.2	14.5	357.2	20.4	24.7	825.7	16.8	67.4
Norway	502.1	14.8	264.3	15.1	24.3	742.1	15.1	47.8
USA	529.5	15.6	80.4	4.6	42.2	567.7	11.6	7.2
Panama	232.4	6.8	131.4	7.5	21.4	342.4	7.0	47.3
All Others	946.0	27.7	513.4	29.5	102.2	1,357.2	27.6	43.5
World	3,403.3	100.0	1,747.8	100.0	241.1	4,910.0	100.0	44.2

* Includes only those scheduled for delivery before 12/31/63.

** Actual fleet plus construction and orders less scrappage.

Oil Co. economists has paralleled several of the assumptions given above. They see two main reasons for the over-supply situation on tankers:

First, the Suez crisis in late 1956 led to the biggest tanker construction boom in history, and just as these vessels began reaching delivery, tonnage requirements fell off because of the reopening of the Suez and the beginning of an economic recession. Free world demand for petroleum had risen 7.4% in 1956, but only 2.8% in 1957 and 4.9% in 1958.

Secondly, in spite of the large number of lay-ups—4 to 6 million tons—and the low level of charter rates, owners continued to order supertankers during the latter half of 1957 and during 1958. This is explained in the economics of the giant tanker. On long runs, a 65,000-ton tanker can cover all costs and make a nominal profit at rates below the operating costs plus depreciation charges of a 20,000 tonner.

Any tanker surplus can be identified in three ways. First, tanker charter rates drop to such a low level that owners find it extremely difficult to cover the costs of small and medium sized tankers. Second, with such low levels, owners are forced to lay up their ships or scrap them. Thus, during a surplus period, tanker charter rates are low and lay-ups and scrappage are high. This has been true for the past two years.

The following brief tabulation indicates the magnitude of decrease of average rates on dirty tankers and two different routes: Column *A* is from USA Gulf Coast to the USA East Coast, and Column *B* is from the Caribbean Sea to the USA East Coast:

	A	*B*
1956	USMC+69%	USMC+58%
1957	USMC— 5%	USMC—17%
1958	USMC—22%	USMC—52%
1959 (6 mos.) .	not available	USMC—60%

As for lay-ups, they totaled 7.5 million dwt on June 10, 1959, of which almost one million were owned by the U.S. Military Sea Transportation Service. Assuming the world fleet at about 60-million dwt on June 10 of this year, the laid-up tonnage represents about 12% of the total. Two years earlier, lay-ups were negligible; they had increased to about 5% at the end of 1957 and 9% at the end of 1958.

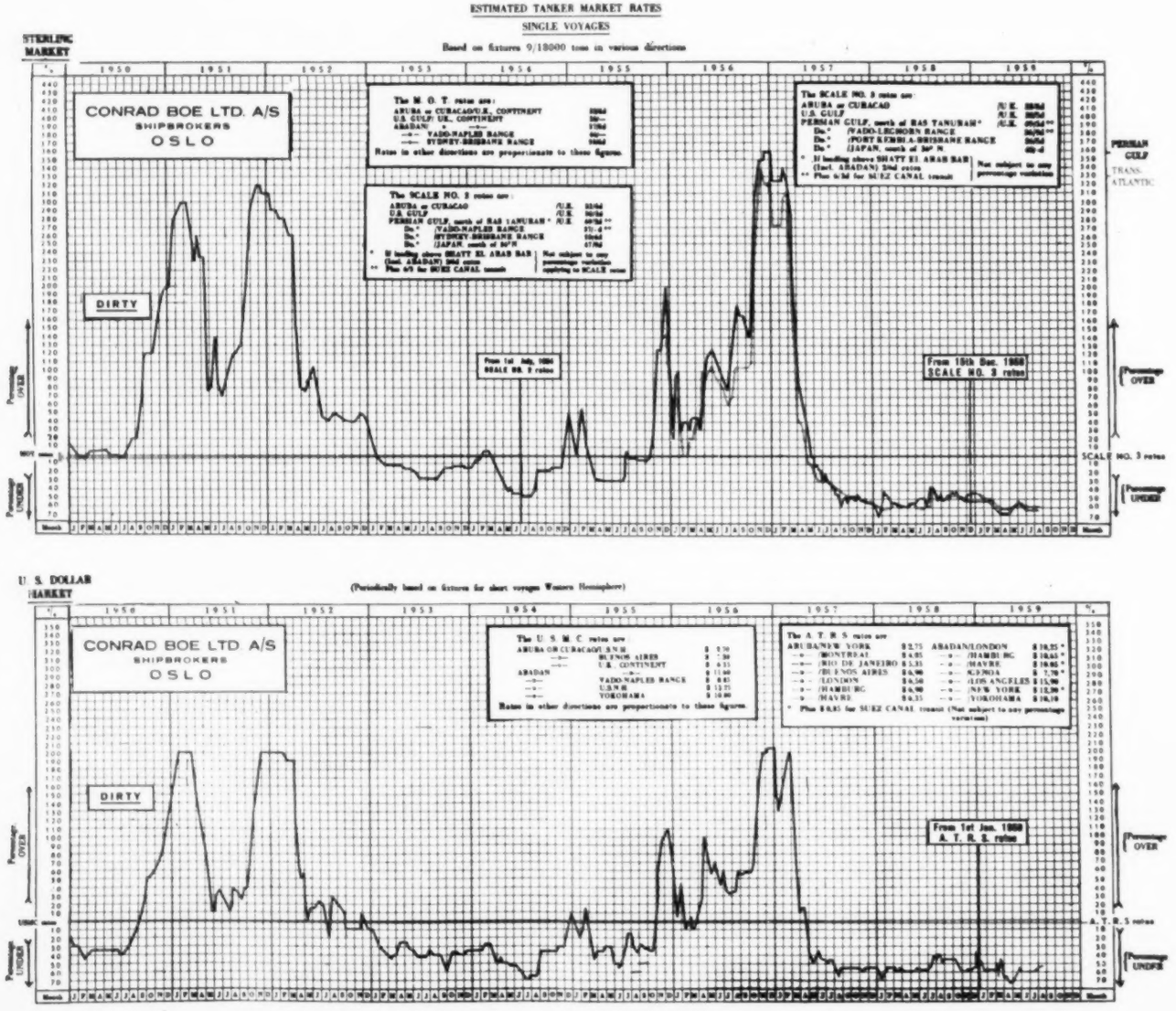
The United States tanker market, however, will most likely shape up more favorably than other parts of the world, both groups of economists agree generally, for these reasons:

(1) Only USA flag tankers can transport between two USA ports. A continuation of the present import restrictions will force U.S. refiners to depend more upon domestic crude oil and thus increase demand for USA flag tankers.

(2) The present order books show only about 5% of the tonnage is destined for USA registry, with no deliveries scheduled beyond 1961. However, it is quite plausible to expect new orders in the near future for delivery after 1961.

(3) Scrappage of USA vessels, especially during the latter part of the 1959-1963 period, will be high because the present fleet is composed of many World War II built ships.

Note: In the Sterling market chart, the scale is M.O.T. rates up to July 1, 1954, No. 2 rates up to Dec. 15, 1958, and then No. 3 rates. In the U.S. dollar market chart, the scale is U.S.M.C. rates up to Jan. 1, 1959, and then A.T.R.S. rates.



Mr. Roger Martin, executive president of Pont-a-Mouson, builder of the new pipeline from Hassi Messaoud to the Mediterranean at Bougie.

Saharan pipeline completed

by R. Martin

Hassi Messaoud crude is not moving to the Mediterranean by pipeline yet, but it soon will be. Finishing touches are being put on the 24-inch line across the mountains to the sea and with construction of a terminal for tankers, the crude will move to France at about 80,000 bbls/day early next year.

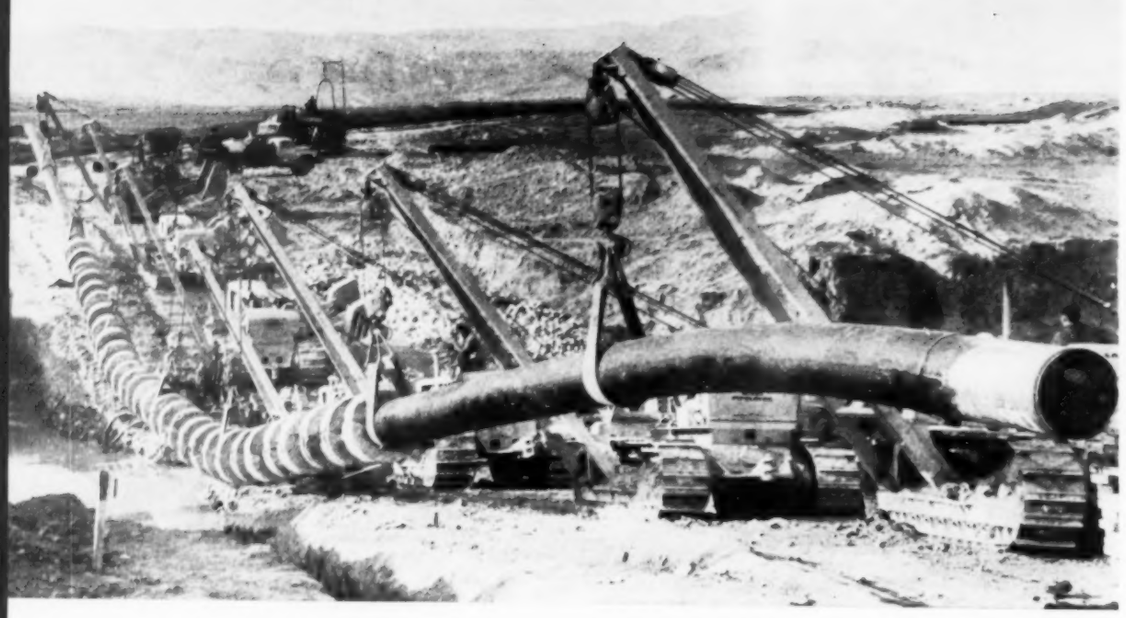
CONSTRUCTION of a major pipeline to move French Sahara crude oil to market was scheduled for completion last month. By next year, oil will be flowing through this 420-mile line from Hassi Messaoud to the Mediterranean port of Bougie at the rate of 80,000 b/d.

The new line is 24-in. for the first 340 miles and 22-in for the balance. It supplements an earlier 6-in., 110-mile line between Hassi Messaoud and Touggourt which was completed by the end of 1958. Flow through the smaller line, some 13,000 b/d, has been forwarded by rail from Touggourt to the Algerian port of Phillipeville.

A third line—24-in., 450-mile, 100,000-b/d—is now under consideration for completion by October, 1960, between the fields of Edjeleh, Tinguentourine, and Zarzaitine and the Mediterranean coast.

The extent of the Hassi Messaoud-Bougie project—130 miles of which was over rugged, sometimes steeply mountainous terrain—is

Opening the Iron Gates. An explosion rocks the barren foothills of the Atlas Mountains as pipeline spreads open up the "Portes de Fer", or Iron Gates on the way to Bougie.



Concrete blocks surround the pipe in this submerged portions where the line crosses the Oued Bokkara. They overcome the line's natural buoyancy, keeping it on the bottom of the water-filled trench.

Wrapping operations on the line, preparatory to laying in the trench.

illustrated in the photos on these pages. The line was built by Compagnie de Pont-a-Mousson, 100-year old French pipe supplier and pipeline contractor, and two of its contracting subsidiaries, Eau et Assainissement and SOCOMAN.

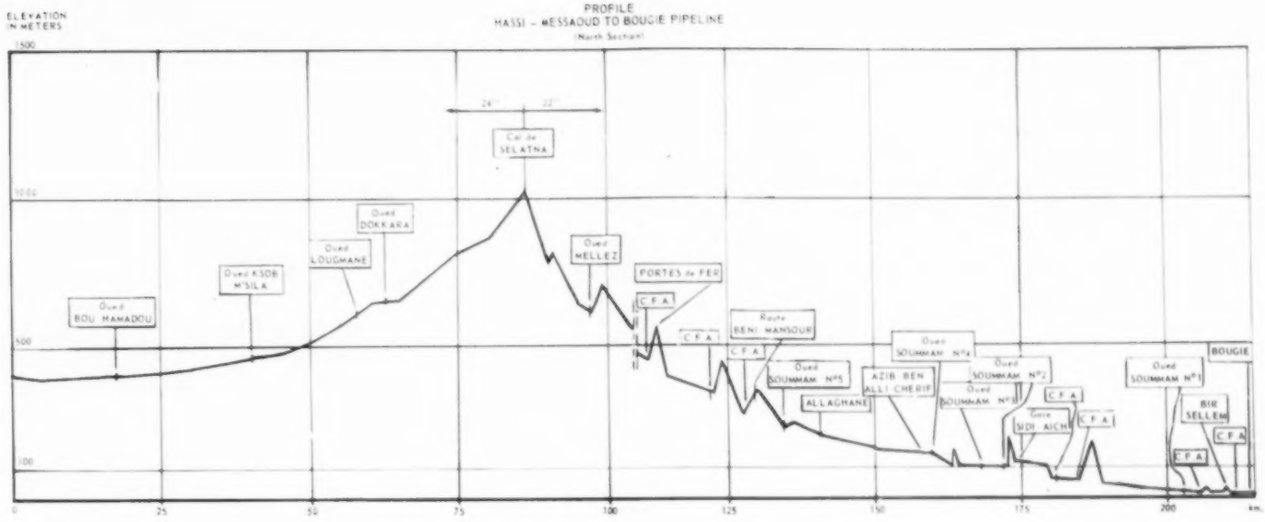
Relatively few problems were met in the laying of the southern-most 280 miles of the line. The northern section, about 130 miles, presented the maximum difficulties to Pont-a-Mousson's contractors.

Starting from plateau at 900 ft above sea level, the line crosses over the Hodna mountains via the Selatna pass (3,500 ft). It then comes down through the Soumann Valley after jumping the Portes des Fer, a rocky barrier 1,800 ft high with slopes on both sides approaching 75°. In addition to getting over this hill country, the line makes 19 crossings of the Azerou River along an 80-mile stretch of its northern section.

Cost of materials for the 130-mile portion of the project is estimated at $3 million, and

Workers housing for the line. About 600 were employed on the spread, 300 Europeans and 300 Moslems.

The world's largest truck carries a complete trenchet and can carry a drilling rig across the desert. Built by Berliet especially for remote oil operations.



the companies, Eau et Assainissement and SOCOMAN, had a field force of 600 men in operation. A total of 2.5 million tons of earth was moved in the job.

Field operations involved two base camps —one at M'Sila and one at Bougie—as well as 10 auxiliary mobile camps. There were 80 pieces of motorized equipment used (pipelayers, cranes, bulldozers, draglines, and the like), and 60 pieces of mechanical equipment (welders, bending and wrapping machines, etc.).

Sahara crude oil, and natural gas as well, will eventually move by pipeline into Europe, according to Roger Martin, executive vice president of Pont-a-Mousson, who says: "We envisage at the present time the interconnection by pipe of the different oilfields as well as the transportation of natural gas and oil to Europe by pipelines laid under the Mediterranean, between Mostaganem and Carthage."

Looking down the Iron Gates, part of the difficult terrain the pipeline traverses.

Camels and their Arab masters go their traditional way, following ancient trade routes across the Sahara. Modern economics are steadily destroying the economic basis on which this age-old trade rests, however, and this sight may soon become a thing of the past.

The tanker corrosion problem

Progress is reported on four approaches:

Zinc instead of magnesium anodes for cathodic systems

Clean, dry air in cargo space

Better protective coatings

Improved washing techniques.

CONTINUED advances toward the solution of tanker corrosion problems are being made by several tankship operators, with results being reported from large scale tests involving such approaches as cathodic protection, dehumidification, and protective coatings.

Technical and economic information on several new or improved techniques was presented at the corrosion sessions of the 1959 Annual Tanker Conference in New Orleans earlier this year. Sponsored by the Central Committee on Transportation by Water, Division of Transportation, American Petroleum Institute, the conference program included reports by representatives of American Oil Co., Socony Mobil Oil Co., Esso Standard Oil Co. and Cities Service Oil Co.

Two improvements in cathodic protection of ballast tanks provide favorable economics, according to Socony Mobil corrosion engineers R. W. Moore and E. E. Nelson. The company plans a full-scale shipboard test of one of the techniques.

The new methods—use of magnesium anodes on painted supports and use of zinc in place of magnesium anodes—were tested in a simulated installation at the company's research laboratories in Brooklyn, N..Y, and results were compared with an installation of the original system, magnesium anodes on unpainted supports, in the SS Socony Vacuum.

Service for the original system had been reported at three years. By using painted supports, this can be increased to a predicted six years, and zinc anodes boost service life to 9.25 years.

The higher average weight of zinc—about 12% greater than magnesium—has been compensated for by a different design for

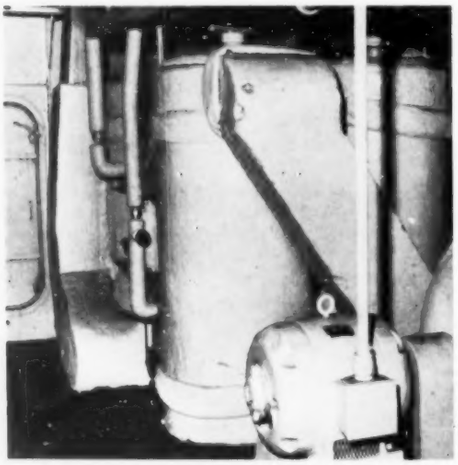


Fig. 1—Flow diagram of silica gel type of dehumidification unit. Photograph shows shipboard installation.

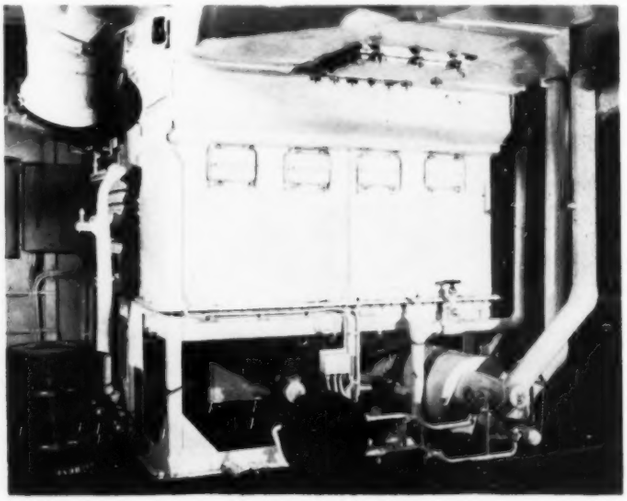
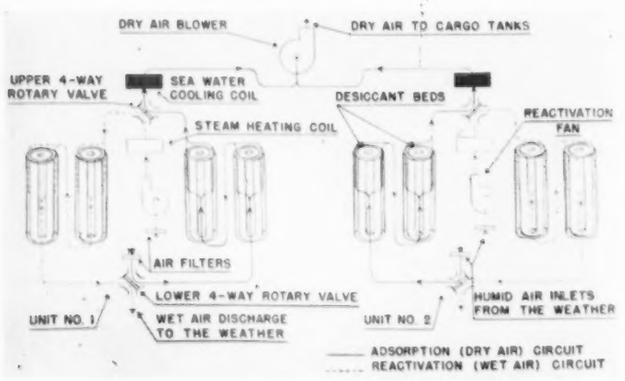
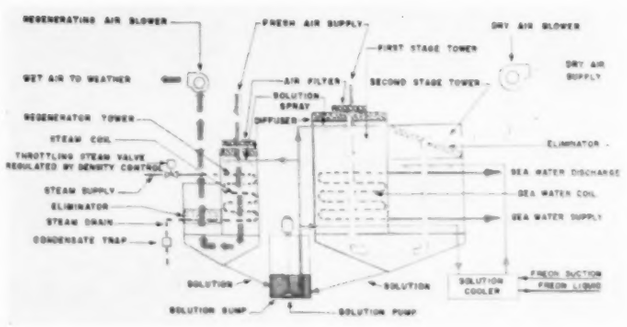
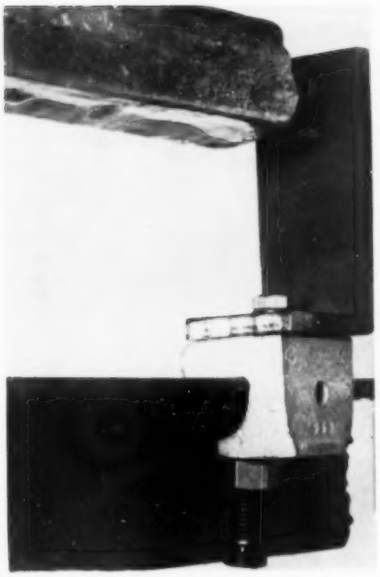


Fig. 2—Flow diagram of lithium chloride type of dehumidification unit. Photograph shows installation on tanker.







Revised clamp design provides an improved support for zinc anodes in cathodic protection systems.

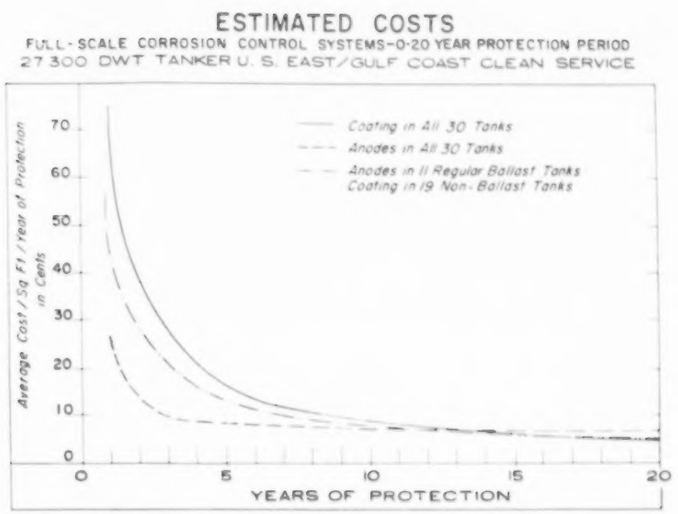


Fig. 3—Coating systems offer an economic advantage in corrosion protection over long service periods.

the anode supports. This provided a zinc anode support weighing 2.5 lb per anode and one for magnesium weighing 24 lb per anode (see illustration). As a result, an overall weight difference for two systems, based on protecting one tank across a ship, shows an average total system weight of 11,876 lb for magnesium and 13,463 lb for zinc.

An analysis of costs has led the company to decide on a ship-scale trial of the zinc anode system. On the basis of one tank across; the yearly cost for zinc is $896.33, for magnesium with painted anode supports it is $1,366.59, and for magnesium with bare anode supports it is $1,868.60. These figures include cost of the initial installation, the anodes, and their replacements. Also, the initial investment for a zinc system is much lower than either of the magnesium systems: $8,291.13 versus $11,575.80 (painted supports) and $10,134.80 (bare supports).

In the upcoming shipboard test, one wing tank will be fitted with zinc anodes and the opposite one with no anodes. Evaluation will be by means of corrosion test panels and permanently installed reference electrodes.

Dehumidification has been found to be an economical and practical means of controlling corrosion in clean oil tankers in the East-Gulf Coast route, it was reported by R. S. Bassett, R. O. Norris, and R. P. Blatchford of Cities Service Oil Co.

Evaluation of shipboard tests indicated that 32,500-dwt supertankers in clean oil service are receiving more than 65% protection with dehumidification (reduction of moisture content of cargo tank atmosphere). At their present corrosion rates, these ships should last for 20 years without requiring steel replacements above the bottom members, which are not receiving enough protection due to frequent bottom flushing practices.

Estimates of probable annual savings, based on steel renewals, range in the neighborhood of $95,000 per ship per year.

Cities Service has been using two types of dehumidification machinery, and installed its first unit on a company tanker in May, 1955. Since that time, installations have been made in all but three of its clean oils tankers. Test panel programs to measure the effectiveness of dehumidification began in 1956, and have included two T-2 tankers and one Baltimore Class (32,500 dwt) supertanker.

The main cause of the corrosion Cities Service was concerned with is that atmospheres in the cargo space of tankers in this service are normally laden with moisture, salts and refined petroleum vapors during both empty and cargo periods. Changes of temperature and relative humidity cause some of these air contaminants to condense on the various metal surfaces in the cargo spaces. Each bead of condensate becomes a tiny electrolytic cell as soon as it forms. It is believed that this kind of corrosion is second only to harbor water and sea water ballast in terms of relative corrosivity.

Condensation collects primarily above the bottom and is always most severe on bulkheads adjacent to ballast tanks when the ship is on an empty voyage. The uncontrolled corrosion rate on tankmembers at or near the top has been measured as high as 0.06 inches penetration per year (ipy), but it usually averages 0.03 ipy.

Dehumidification's function primarily is the displacement of wet air by artifically dried air and thereafter maintaining a constant dry air pressure to prevent further entry of moist air. Theoretically, since the moisture-carrying capacity of the dehumidified air is far above its actual moisture content, it will absorb all moisture already present on the steel in addition to preventing formation of condensate. This is important because the removal of moisture from the steel is necessary before corrosion can be stopped.

Dehumidification as applied to tankers is outlined briefly as follows:

(1) Empty tanks are kept constantly dried by the introduction and presence of dehumidified air under a constant low pressure.

(2) A continuous pressure of dehumidified air prevents the entry of marine air in the space above the cargo.

(3) A continuous introduction of dry air dries the tanks more rapidly after Butterworthing or the discharge of ballast.

(4) Further benefits are realized in that the internal atmosphere passes through the explosive range more rapidly, or is gas-freed more quickly by the continuous introduction of dehumidified air.

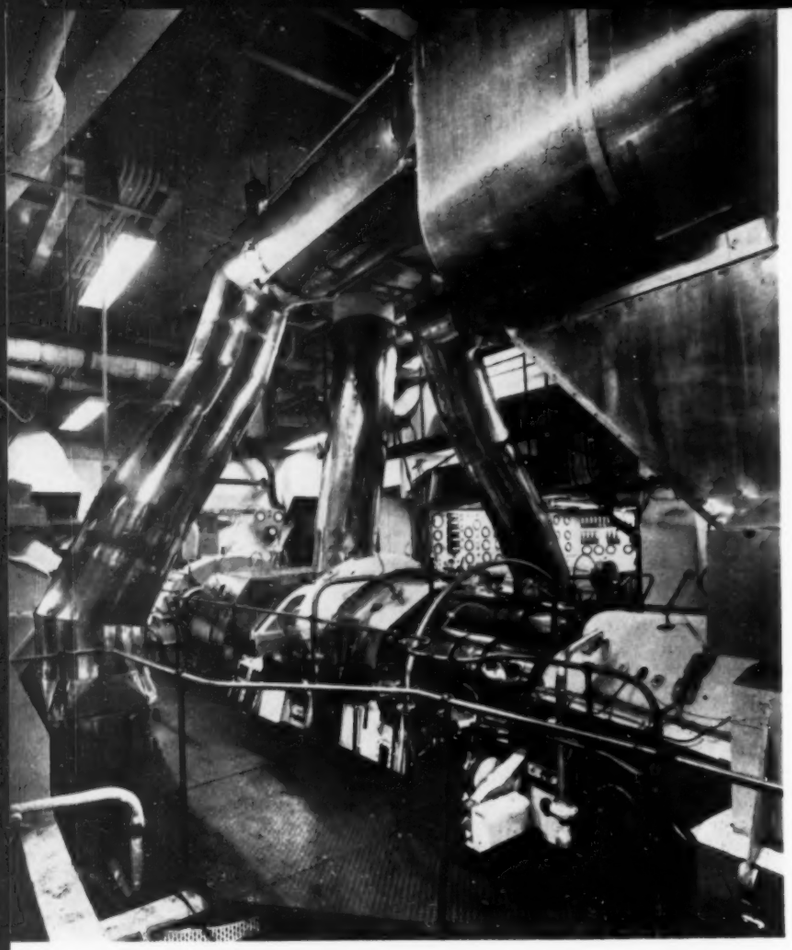
Two types of dehumidification machines are being used. One, trade-named "Tankcaire," is manufactured by Cargocaire Engineering Corp.; the other is "Kathabar," is made by Surface Combustion Corp. They are shown in the accompanying illustrations and in the schematic flow diagrams in Figs. 1 and 2.

Both systems are automatic, principally by electric-pneumatic control. Tankcaire utilizes silica gel, whose hygroscopic properties cause it to absorb water from the atmosphere without permanent change, so it may be regenerated by heat. Kathabar uses lithium chloride as a humectant, in a 43.5% aqueous solution, with 1% sodium chromate as an inhibitor.

Installation of Tankcaire machinery on T-2 tankers was in a 3,420 cu ft room separated from the engine room. Weight of the equipment approaches 7,800 lb and two units comprise an installation. The Kathabar plant is in the engine room adjacent to the ship's refrigeration plant. Weighing about 14,000 lb, the unit occupies approximately 650 cu ft of space.

In addition to the estimated savings mentioned above, Cities Service concluded that

(Continued on page 74)



General view of the 5,500 hp gas turbine on AURIS.

The world's first gas turbine tanker

Here is a detailed report on the ship and the results of its extensive sea trials. Shell sees potentialities for this type of vessel propulsion in methane carriers or coupled with nuclear drive.

THE first tanker to be driven entirely by a gas turbine, the 12,000 dwt "AURIS" of Shell Tankers Ltd., has successfully completed extensive sea trials and joined the Shell fleet. It is powered by a 5,500 bhp (brake horse power) open cycle gas turbine designed by British Thomson-Houston Co. and built partly by them and partly by Cammell Laird & Co.

The vessel was built originally by Hawthorn Leslie & Co. in 1948 and the installation of this new power source was decided on as a result of the success of the experiment started in 1951 of fitting a small gas turbine which helped the main diesels to drive the ship.

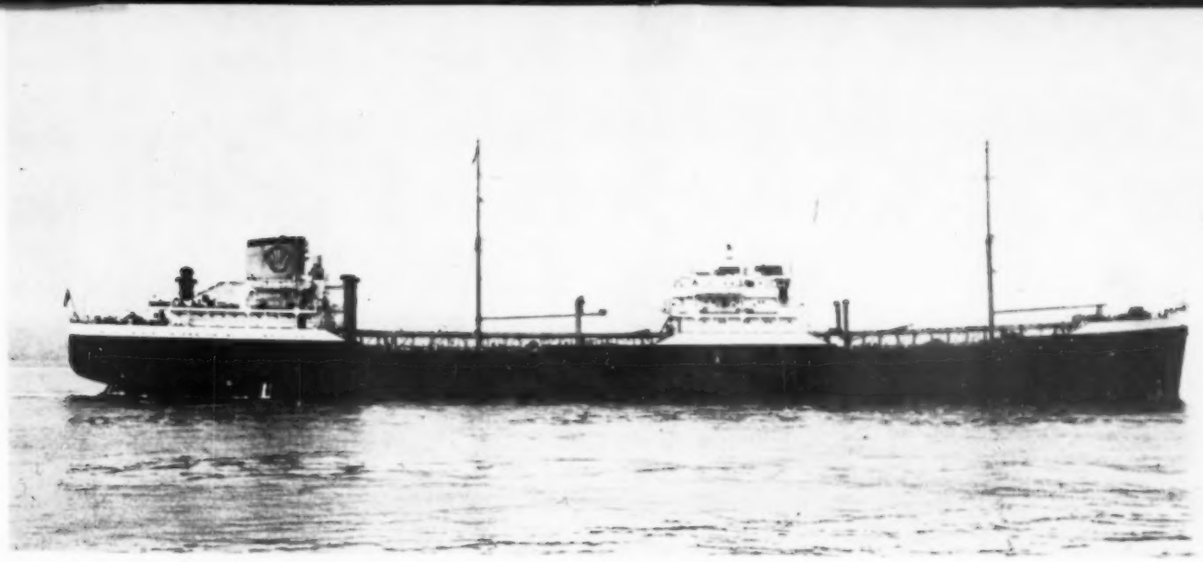
Power is transmitted to the propeller through double reduction gearing, which is of conventional type except that it incorporates a new means of going astern designed by Pametrada, the research organization of the British shipbuilding industry. This embodies a hydraulic coupling for ahead rotation of the propeller and a reversing torque converter for astern rotation.

The turbine has two axial flow compressors in series, separated by an intercooler. The LP compressor is driven by the LP turbine which also provides the power output to the shaft, and the HP compressor is driven by the HP turbine. The maximum turbine inlet temperature is 650 C, the exhaust from the LP turbine passing through a tubular heat exchanger and then through a forced circulation waste heat-broiler. The main particulars of the set are given in Table 1.

The sea trials, which lasted two weeks in the Firth of Forth and the Irish Sea, were of a most comprehensive nature, with 439 hours of light running and 510 hours loaded. The performance trials covered varying speeds, 6 hours at full power, 4 hours at full power astern, and very thorough maneuvering trials. Fuel used was gas oil

Table 1—Specifications of "AURIS" Power Plant

Net turbine output, bhp	5,500
Ambient air temperature, C	23
Ambient air pressure, psia	14.7
Pressure ratio	6:1
Intercooler thermal ratio, %	84
Turbine inlet temperature, C	650
HP turbine speed, rpm	5,800
LP turbine speed, rpm	3,840
Propeller speed, rpm	120
Designed fuel, lb/bhp hour	0.52
LCV of fuel, Btu/lb	17,500



The Shell tanker "AURIS", originally a motor ship of 12,000 dwt, now is fitted with a 5,500 hp gas turbine.

though, in addition, a 24-hour trial was made at 3,600 shp (shaft horse power) using a normal boiler fuel (1,200 sec Redwood No. 1 viscosity at 100F) and maneuvering tests were also carried out with this fuel. Combustion is reported as having been excellent with both fuels throughout the whole series of trials and the funnel exhaust was invisible.

The object of the "AURIS" experiment was to find out whether gas turbines can be used with advantage in preference to steam turbines or diesel engines for driving merchant ships. They have the potential qualities of lightness of weight and simplicity combined with low maintenance, and a single installation combining these virtues would have a strong claim for considerations.

The general conclusions reached were that the trials showed excellent performance of the gas turbine, with quick response to calls for rapid power increase or decrease, and on the endurance runs all temperatures reached a steady level in a short time. The reversing transmission behaved very satisfactorily and gave rapid maneuvering; for example, when the ship was proceeding ahead at 103 rpm the propeller shaft was brought to rest 20 seconds from the "full astern" order being given.

The maximum astern power available from the astern torque converter was less than the specified 65% of ahead power, but an improved design is expected to have the required efficiency. Ahead rotation when maneuvering is effected by the hydraulic coupling, but a hydraulic-operated friction clutch is fitted and is engaged under cruising conditions so as to eliminate the 6% slip in the coupling.

Fuel consumption was a little above the designed figure of 0.52 lb bhp hour and the reason for this is being investigated. Maximum speed is now 14.3 knots against the figure before conversion to gas turbine of 12.85 knots with diesel-electric machinery of 3,750 shp.

The main overall conclusion reached by Shell is that the thermal economy of the present unit in the "AURIS" is about the same as a comparable steam turbine and at a disadvantage compared with a modern marine diesel engine. Maintenance costs should be somewhat lower, but unfortunately it is clear that this advantage could never be of sufficient extent to offset the high capital cost of a gas turbine unit of this design.

Accordingly, this type of machinery will not be installed in any other Shell ships, but the "AURIS" will be run to gain further experience, not only of the machinery but also of the new form of hydraulic transmission which might well be applied to a conventional steam turbine power plant.

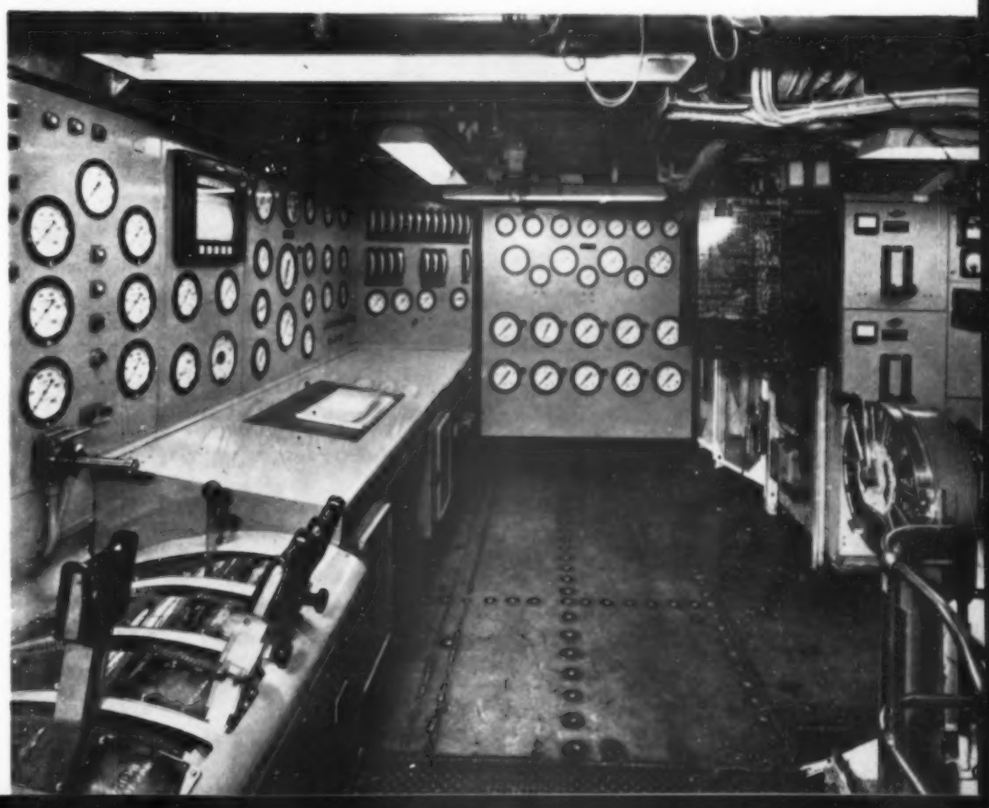
It is, however, recognized that the gas turbine may still find a place in the commercial marine field; for example, it might prove to be eminently suitable for employment in methane carriers or possibly be teamed up with nuclear propulsion.

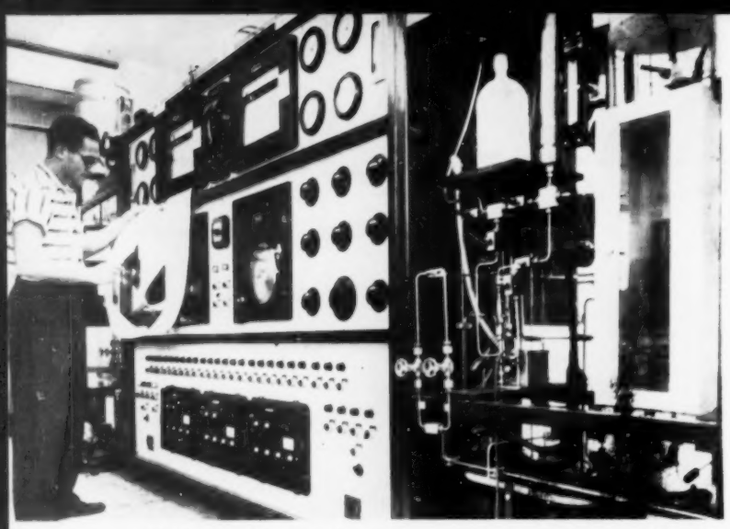
Table 2—Results of "AURIS" Trial Runs

Total running time (light), hrs	439
Total running time (loaded) hrs ..	510
Actual starts from stop	38
Propeller starts from stop	360
Engine movements	941
Highest maneuvering rate .. 140 in 4 hr*	
Engagements of friction clutch ...	19
Propeller revolutions (including basin trials)	2,183,553
Miles steamed ahead	2,541
Miles steamed astern	62
Highest power attained, shp	5,030
Steady ahead speed (loaded), knots	14.17
Steady ahead speed (light), knots	14.61
Steady astern speed, knots	5.31
Stopping at max. displacement from 107 rpm:	
Distance, ft	4,803
Time, minutes	6.5
Min time to stop shaft from 86 rpm, secs	13
Fuel consumed by gas turbine:	
Gas oil, tons	429
Fuel oil, tons	27.6

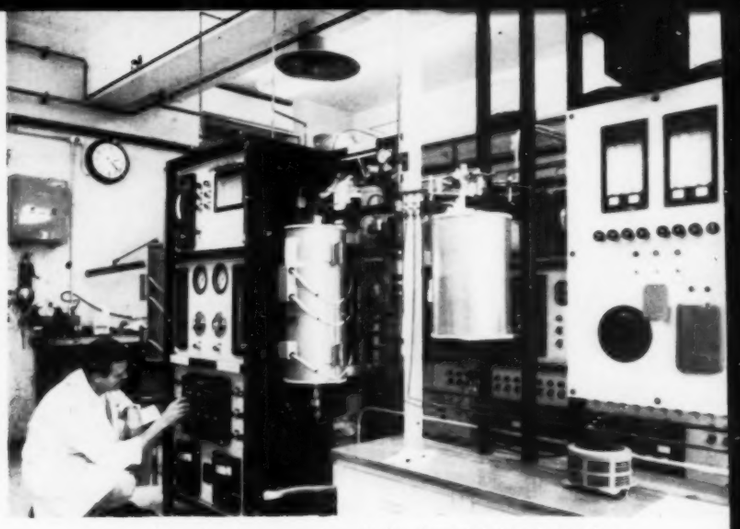
* Includes 34 from ahead to astern or astern to ahead, and 36 starts from stop position.

Main control room for Shell's gas turbine tanker.





Fluidized fixed-bed cracking catalyst test unit, one of the two units at the Washington Research Center of W. R. Grace & Co. which feature completely automatic operation and controls for cyclic catalytic cracking of heavy petroleum stocks. Panel controls and records temperatures at twelve different points in the cracking unit which can be seen behind the man examining the recording chart. Temperature controllers are located in the row along bottom panel.



Apparatus for comparison of the characteristics of cracking catalysts that are employed in the manufacture of high octane motor and aviation gasoline. W. R. Grace & Co. photo.

Product improvement cuts cracking catalyst costs

Manufacturers of fluid catalyst have helped refiners cut unit losses 40% in recent years by control of density, pore diameter, surface area, particle size distribution and attrition resistance.

A STRIKING example of the economic benefits of research may be seen in the fluid catalyst industry. Within the past 7-8 years consumption of fluid type catalysts per barrel of charging stock has been reduced about 40% and at the same time the unit price has decreased.

The refining industry in the United States consumes nearly 300-million lb/yr at a cost of about $45-million. Had there been no increase in catalyst life, today's consumption would be on the order of 500-million lb/yr, and the annual bill for fresh catalyst would have approximated $80-million. Improvements in the use factor have thus been more than great enough to overcome the inflationary spiral which has laid so many added burdens on all branches of modern industry.

The existence of ample plant capacity to produce synthetic catalysts has created an atmosphere of keen competition in the catalyst industry and without doubt has been a factor in keeping the price per pound from advancing in line with most other commodities and manufactured products. The competition for business also has spurred research activity on the part of manufacturers to reduce processing costs and improve their products.

The insistent demand on the part of oil refinery management for lower operating costs has recently been instrumental in the experimental development of new products created by chemical improvement of natural catalysts.

The new catalysts are a compromise between the natural clays and the synthetics in activity, useful life and price. Quantities of the new natural-synthetic product are being added as make-up to existing stocks at about 10 refineries in the United States but thus far no conclusions have been announced as to the economics of the new product. No newly built plant has been started up on the natural-synthetic catalyst and, as a matter of fact, no suitable start-up mix has been available because it is never desirable to bring a unit onstream with 100% new catalyst.

There has been no really fundamental change in synthetic fluid catalysts since the original development of Silica-alumina catalyst nearly 20 years ago. The patent literature is full of references to work done in the development of additives as promoters. Metal oxides of various characteristics involving chromium, vanadium, tungsten, molybdenum and titanium, to mention a few, have been proposed. An example of the work being done is noted in the cracking patent reviews published within the past year in World Petroleum.[1,2]

Thus far there has been little demand on the part of the industry for commercial production of catalysts of radically different chemical composition. Commercial trials were made of a silica-magnesia catalyst but the product was abandoned because it lacked thermal stability and had regeneration difficulties. Although the catalyst manufacturers have greatly increased the alumina content of some grades, they have devoted much of their research to the variation of manufacturing processes for the improvement of catalyst particle structure. By process modification they have reduced attrition losses, increased resistance to poisons, and improved activity.

Process control is quite complex in catalyst production because all three phases of matter must be dealt with. Automation and standardization of procedures is much more difficult than in most manufacturing operations. As a result, skill of the engineers and chemists is of prime importance.

In their efforts to keep catalyst prices low, manufacturers have devoted much attention to reducing acid and alkali requirements. Most recent development in this field has been the application of carbon dioxide to eliminate the use of either sulfuric acid or ammonia. The process developed by Davison Chemical division of W. R. Grace Co., manufacturer of 55% of the synthetic fluid cracking catalysts in the U.S. and Canada is covered by U.S. Pat. 2,886,512

[1] Review of Recent USA Patents on Catalysts for the Petroleum Industry by Heinz Heinemann and Harold Shalit, World Petroleum, Nov. 1958.

[2] New USA Patents on Catalysts in the Petroleum Industry by Heinz Heinemann and P. A. Lefrancois, World Petroleum, July 1959.

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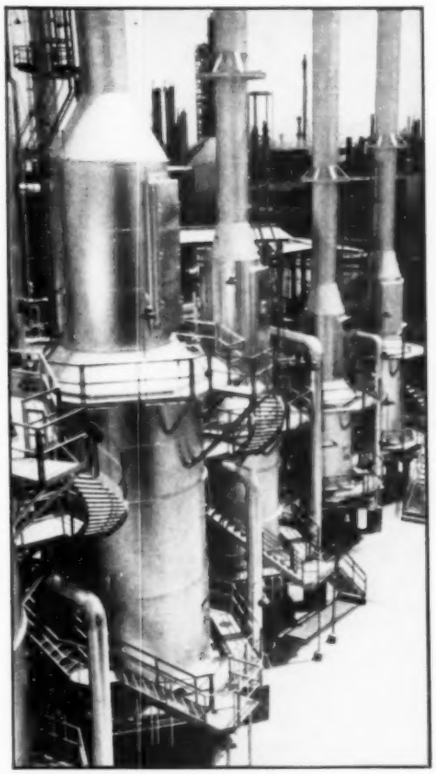

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The artist's concept of the patterns of Schlumberger Focused Logging is represented by sharply sculptured sections lifted from the formations surrounding the borehole. (1) Sonic Log (2) Proximity Log (3) Laterolog (4) Microlaterolog (5) Induction Log

THE EYES OF THE OIL INDUSTRY®

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issued May 12 and is now being commercially applied by Davison.

Heretofore a three-step process has been used in the production of synthetic silica alumina fluid catalysts. The process involves: (1) formation of an alkaline silica hydrogel by incompletely neutralizing a sodium silicate solution, usually with sulfuric acid; (2) adding an aluminum sulfate solution containing a small amount of free sulfuric acid; and (3) adding enough ammonia to precipitate the alum as alumina in and on the hydrogel. Subsequently, the silica-alumina gel is filtered, washed free of soluble salts and spray dried.

In the new Davison method, an aqueous alkali metal solution is neutralized by the addition of carbon dioxide. The silica hydrogel formed in this way contains dissolved and dispersed alkali metal carbonate. Desired alumina content is obtained by adding an aqueous solution of an aluminum salt of a strong mineral acid. This salt reacts with the alkali metal carbonate, precipitating alumina and liberating carbon dioxide. The resulting silica-alumina composite is separated from the reaction mixture, washed free of soluble salts and dried.

The Davison patent reports that in one process example 11.5 lb of CO_2 gas was bubbled through 960 lb of 6.4° Bé. SiO_2 Na_2O at 100° F. This quantity of CO_2 was sufficient to neutralize 71% of the alkali. The resulting silica hydrogel contained 4.6% SiO_2 and exhibited a pH of 10.1. The hydrogel was aged 30 minutes, after which 100 lb of an aluminum sulfate solution was added, containing 6.6% Al_2O_3 and one wt % of free sulfuric acid. The resulting silica-alumina composite, which exhibited a pH of 6.2, was aged five minutes before washing and drying.

The new process produced a catalyst with a surface area of 482 m^2g, compared with a 452 m^2g for production the three-step process. Pore volume was increased from 0.49 to 0.54 cc/g, pore diameter from 43 to 45 A°, and particle density was reduced from 1.09 to 1.03 g/cc.

Activity of the catalyst produced by the CO_2 method was increased measurably. Steamed activity was increased from 29.8 to 31.0 D+L and thermal activity from 54.6 to 56.4 D+L. Both carbon and gas producing factors were reduced.

Davison reported that the new process uses 0.15 to 0.35 ton of CO_2 per ton of dry catalyst and no sulfuric acid or ammonia. The older process used 0.355 ton of sulfuric acid and 0.16 ton of anhydrous ammonia per ton of finished dry catalyst.

Although reduction in production costs has been an important factor, the improvement in catalyst characteristics has been of even greater importance to the refiner from a cost standpoint. Stack loss control through product improvement is one factor.

Design of cyclones is of course important, but research has indicated that stack losses may be radically reduced by particle size and attrition control on the part of the catalyst manufacturers. Tests were made recently of two different catalysts with the following particle size and distribution characteristics:

Microns	Lot I wt %	Lot II wt %
0-20	7.0	1.0
0-40	21.0	11.0
0-74	75.0	77.0
0-105	92.0	89.0
0-149	99.0	95.0
Attrition Index	30.0	18.0

Stack losses of Lot No. 1 averaged 4.2 t/d over six months, while losses of Lot No. 2 were only 2.6 t/d, a saving of $172,000 per year. The saving appears to stem to a great degree from the reduction in percentage of catalyst of 40 microns and smaller, assisted by the tougher character of the particles themselves.

Research has indicated that particle size distribution of catalyst must be relatively narrow, with no more than an elevenfold distribution between smallest and largest particles and balance must be toward the fine side, to preverve a proper density in the fluid bed. Particle size distribution is of importance also in cyclone efficiency.

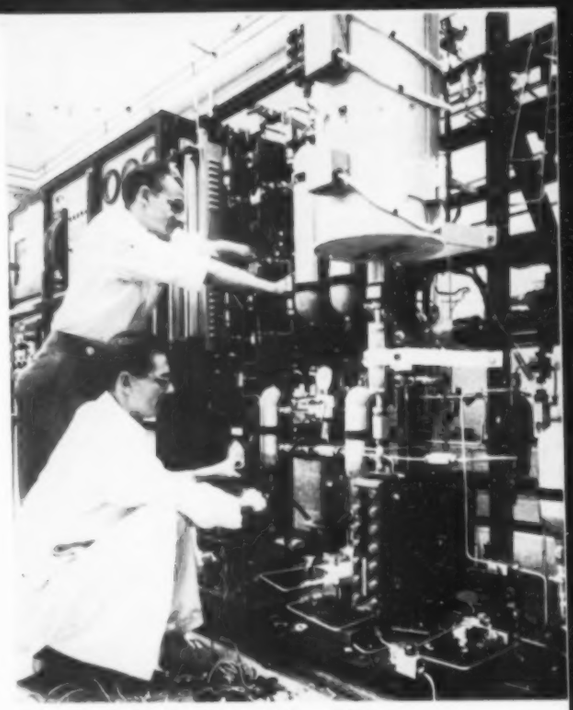
In any catalyst, attrition resistance must be high to prevent undue losses through creation of small diameter fines in the unit. Both original particle size distribution and resistance to attrition in service have been improved by catalyst manufacturing techniques in recent years.

An outstanding characteristic of silica-alumina cracking catalyst is the great porosity of the material and the astonishing surface area of the solid which results. The cracking reaction occurs on the surface of the catalyst at what theorists believe to be active centers which have the property of promoting the complex reactions known as cracking.

In theory, all the manufacturer has to do is increase the surface area to the maximum extent in order to have the best catalyst. In actual fact, this is an incorrect oversimplification. Pore diameters of the capillaries must be large to permit free entry of hydrocarbon vapors for cracking in the reaction cycle and similarly free entry of oxygen for burning and exit for products of combustion in the regeneration cycle. The diffusion factor thus is based on pore volume and it must not be sacrificed to obtain maximum surface area.

Structural stability of the catalyst particles also must be taken into consideration. It has been shown that this is also related to the pore structure. In theory, sintering of the exterior surface of a silica-alumina catalyst particle does not take place until 1700°F and so should not be important under normal plant operating conditions. Actually, it has been found that sintering can begin at much lower measured temperatures in commercial units, with the result that pore openings may be closed or restricted in cross section and regeneration retarded or prohibited. This may happen particularly when cracking units are being pushed beyond optimum capacity.

The catalyst manufacturer must control pore diameter to produce particles with maximum pore volume consistent with adequate surface area, and these factors balanced with bulk density. When a proper balance is attained, regenerator temperatures may be kept at a lower level, the carbon burning rate increased and catalyst consumption reduced.



High pressure pilot unit is rewired for catalyst test run by research workers for Davison Chemical Division of W. R. Grace & Co., at Clarksville, Md.

Stability of a cracking catalyst in service is affected greatly by resistance to poisons which tend to reduce activity. Metals brought in with the charge stock, deposited during the reaction and not removed during the regeneration cycle are responsible for most of the loss of catalyst selectivity known as poisoning. Resistance to poisons has been improved by aging at certain points in the manufacturing process.

In general it may be said that the variables found most effective in controlling catalyst quality are time, temperature and pH. Continuing studies of these factors are in progress at a number of laboratories. One such is the recently dedicated Washington Research Center of W. R. Grace & Co. at Clarksville, Md., where research for Davison is conducted.

Since the laboratories were opened some months ago, a mass of basic data has been accumulated through the continuous operation of automatic pilot plants. With this data assembled, the research team now feels that it is ready to branch out into new territory in a search for better catalysts and changes in manufacturing techniques which may improve activity, selectivity and stability of present catalysts.

Davison researchers observe that catalysis now is at the heart of most petroleum processing and they feel that the surface has not yet been scratched. More must be learned about selectivity, for example, so that the refiner can have greater flexibility in producing a product mix which will more nearly match changing market conditions. In catalytic cracking the refiner is eager to spend time on processing the bottom of the barrel, perhaps making greater use of the hydrogen for other purposes than sulfur removal. The reforming and hydrogen desulfurization sections of the laboratories are as busy as the catalytic cracking section.

END

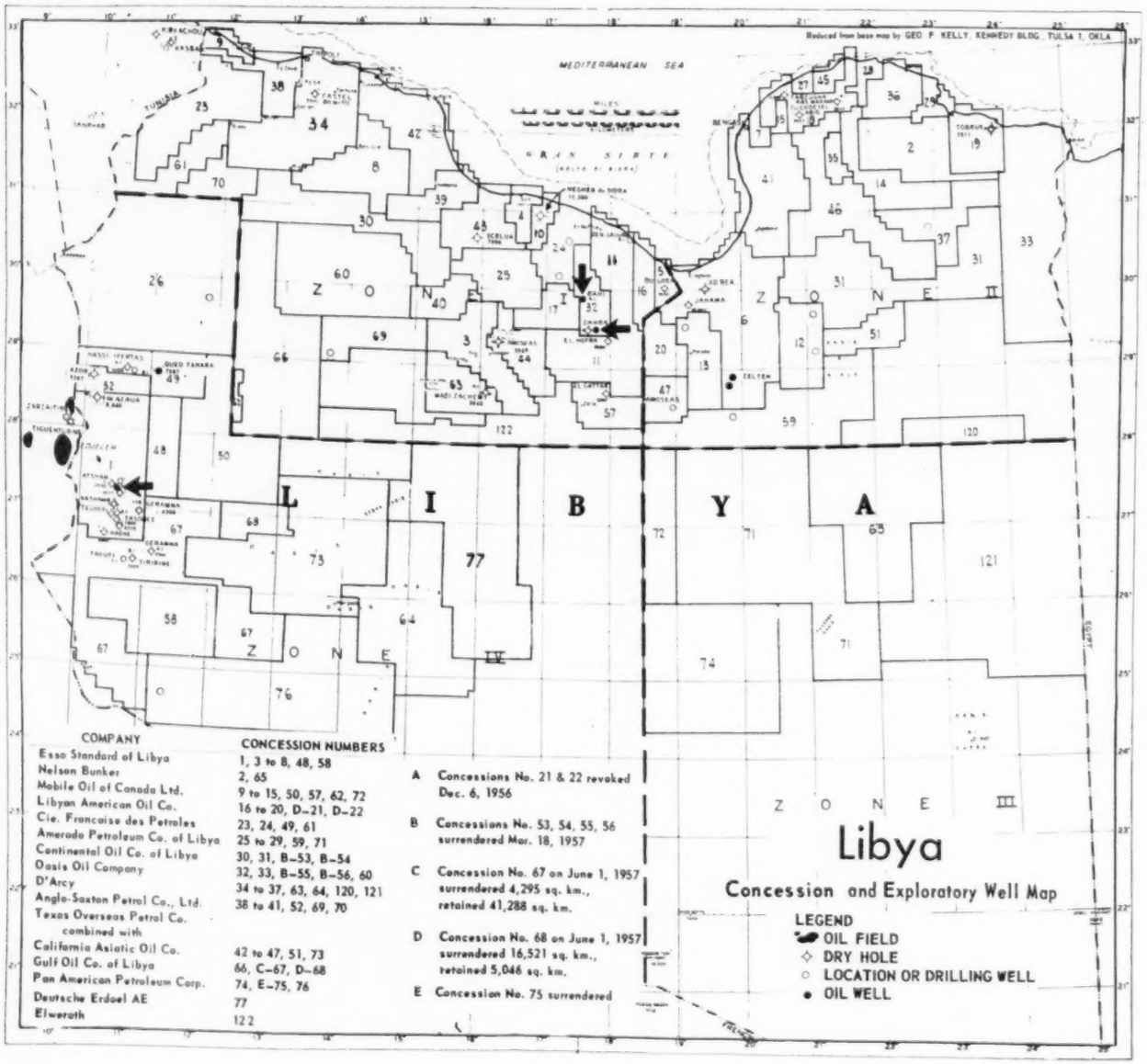
"Big Oil" found in Libya

LIBYA has been catapulted in the front ranks of oil companies almost overnight by the Zelten discovery by Esso Standard (Libya). Cautious preliminary estimates put Zelten's reserves at about 10 billion barrels, and its areal extent at 150,000 to 200,000 acres, with about 50,000 barrels reserve per acre (Jersey officials privately estimate it at more, about 100,000 barrels per acre). That makes Zelten "big oil," rivaling Aramco's mammoth Ghawar field in Saudi Arabia, the world's largest.

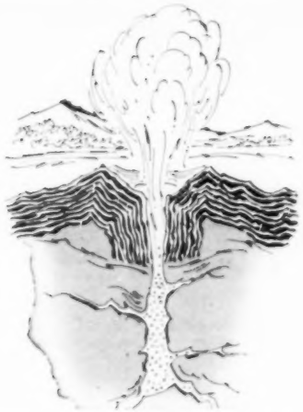
Esso plans $100 million investment in a pipeline and marine terminal, based on its belief that there may be more oil in this single field than in all of Algeria. If so, it will be a great deal easier to get out. Zelten is only 100 miles from the coast and about one mile (5,770 ft) deep, compared with 600 miles from the coast and two miles depth for Algerian crude from Hassi Messaoud. Porosity and permeability are excellent in the Zelten wells so far. The limestone pay in the Paleocene has "holes big enough to throw a bull in" according to some humorous comment from persons within the industry who should know.

The discovery well, Zelten No. 1, flowed 17,500 b/d on a production test of a 205-ft section of Paleocene limestone topped at 5,460 ft. Oil was 37 gravity sweet crude. The second well, drilled 4.5 miles southwest, came in at 15,000 b/d, producing from the same formation at 5,770 to 5,915 ft. Total pay thickness is estimated at 296 ft.

Five other companies have made oil finds in Libya since exploration began on a big scale two years ago. One estimate of probable reserves in this basin area is 50 billion. This would make Libya one of the largest oil reserves in the world.


Reduced from base map by GEO. P. KELLY, KENNEDY BLDG., TULSA 1, OKLA.
MEDITERRANEAN SEA
TUNISIA
GRAN SIRTE
ZELTEN
ZONE II
ZONE III
ZONE IV
LIBYA
Libya
Concession and Exploratory Well Map
LEGEND
OIL FIELD
DRY HOLE
LOCATION OR DRILLING WELL
OIL WELL
COMPANY
CONCESSION NUMBERS
Esso Standard of Libya — 1, 3 to 8, 48, 58
Nelson Bunker — 2, 65
Mobile Oil of Canada Ltd. — 9 to 15, 50, 57, 62, 72
Libyan American Oil Co. — 16 to 20, D–21, D–22
Cie. Francaise des Petroles — 23, 24, 49, 61
Amerada Petroleum Co. of Libya — 25 to 29, 59, 71
Continental Oil Co. of Libya — 30, 31, B–53, B–54
Oasis Oil Company — 32, 33, B–55, B–56, 60
D'Arcy — 34 to 37, 63, 64, 120, 121
Anglo-Saxton Petrol Co., Ltd. — 38 to 41, 52, 69, 70
Texas Overseas Petrol Co. combined with California Asiatic Oil Co. — 42 to 47, 51, 73
Gulf Oil Co. of Libya — 66, C–67, D–68
Pan American Petroleum Corp. — 74, E–75, 76
Deutsche Erdoel AE — 77
Elworath — 122
A Concessions No. 21 & 22 revoked Dec. 6, 1956
B Concessions No. 53, 54, 55, 56 surrendered Mar. 18, 1957
C Concession No. 67 on June 1, 1957 surrendered 4,295 sq. km., retained 41,288 sq. km.
D Concession No. 68 on June 1, 1957 surrendered 16,521 sq. km., retained 5,046 sq. km.
E Concession No. 75 surrendered

Like Fabulous "Old Faithful"...



"Old Faithful" is a modern reminder of volcanoes that raged thousands of years ago. Still hot, volcanic rock deep beneath the earth heats water around it beyond surface boiling temperatures. This water expands under pressure into steam, exploding upward with such force that it pushes a column of water as high as 150 feet into the air.

there's more to Cities Service than meets the eye!

"Old Faithful" is as entertaining as it is punctual. But few observers realize they are actually watching the steaming aftermath of great volcanoes which raged thousands of years ago.

Similarly, the facts of oil company operations escape the casual observer. Not many for example, would imagine that Cities Service products are found not only at their service stations but as ingredients in drugs, plastics, clothing, building materials and countless other items. Few are aware of the world-wide operation and huge staff this entails.

To help meet America's petroleum needs today, Cities Service has invested a billion dollars in modern facilities. Meeting future demands will be even more costly. Within the past two years, Cities Service has spent over $350 million on this progressive program.

Only in this way can America be given what she must have for progress—more jobs, more and better petroleum products.

OIL'S FIRST CENTURY
BORN IN FREEDOM
WORKING FOR PROGRESS

CITIES SERVICE

A decade of progress in motor lubricants

A thorough review of technological achievements in lubes for diesel and gasoline engines, in new products, new methods, and basic research, plus a look at the future. Includes a valuable and complete bibliography.

A FEATURE of the midyear meeting of the refining division of the American Petroleum Institute was a session on petroleum products. At this session A. L. Lyman and F. W. Kavanagh of California Research Corp. presented a monumental study of progress in the formulation of lubricants during the past 10 years. The paper dealt primarily with diesel and gasoline engine oils and centered its attention on the additives which have been developed to keep pace with the growing severity of service required in modern engines. A radically digested version of the paper is given here but the entire bibliography covering 172 papers, books, and patents is printed in full.

In their introduction the authors report that satisfactory base stocks had been developed before the opening of the decade but that the period was notable for improvement through the use of additives. In Table 1 is given the annual consumption and cost of these additives for 1954 and 1958.

Diesel Engine Oils: Table 2 lists the improved diesel engine lubricating oils developed during the period. The following may be noted:

(1) All of the oils from low to moderate detergency level contain zinc thiophosphates or their equivalent. These are truly multifunctional additives because:

a. They protect copper-lead and other alloy bearings from corrosion.

b. They increase oxidation resistance of oils, even in the hot, ring belt zones.

c. They provide the extreme pressure action necessary to prevent scuffing or pitting of cams and lifters.

(2) The detergency level in the table is expressed in terms of millimoles per kilogram, convenient only for additives containing metals.

The detergency level has increased appreciably during the past decade. Compared to the war years, the modern, large volume oils, such as MIL-L-2104A and Supplement 1, have increased in level by two to four times. And the increase is even greater for the oils developed for special services, such as the Caterpillar Series 2 and Series 3 oils. Even more massive doses of additives have been used effectively in special cylinder lubricants for marine diesels burning residual fuels.

Three different methods were used to reach this high detergency level. It is significant that the use of more than one type of additive, e.g., phenates and sulfonates in the same oil, has become much more prevalent. And new types of additives to achieve this type of result more economically, such as overbased sulfonates and overbased olefin-P_2S_5 reaction products, have become popular.

Lubricating oils for railroad diesels deserve special mention because they must be truly functional. They are of the Navy 9000 type. But in these, a much higher standard of silver-bearing performance is required, which is achieved by selection of additives and by the use of silver pacifiers to help meet railroad requirements.

Diesel engine oil additives should be examined with respect to the environment under which they must function. Much of the deposits in diesel engines come from oxidation of the lubricating oil. Experiments have shown diesel engine blowby is largely air, and oxidation proceeds somewhat more rapidly than in a gasoline engine where CO and CO_2 reduce available oxygen by dilution.

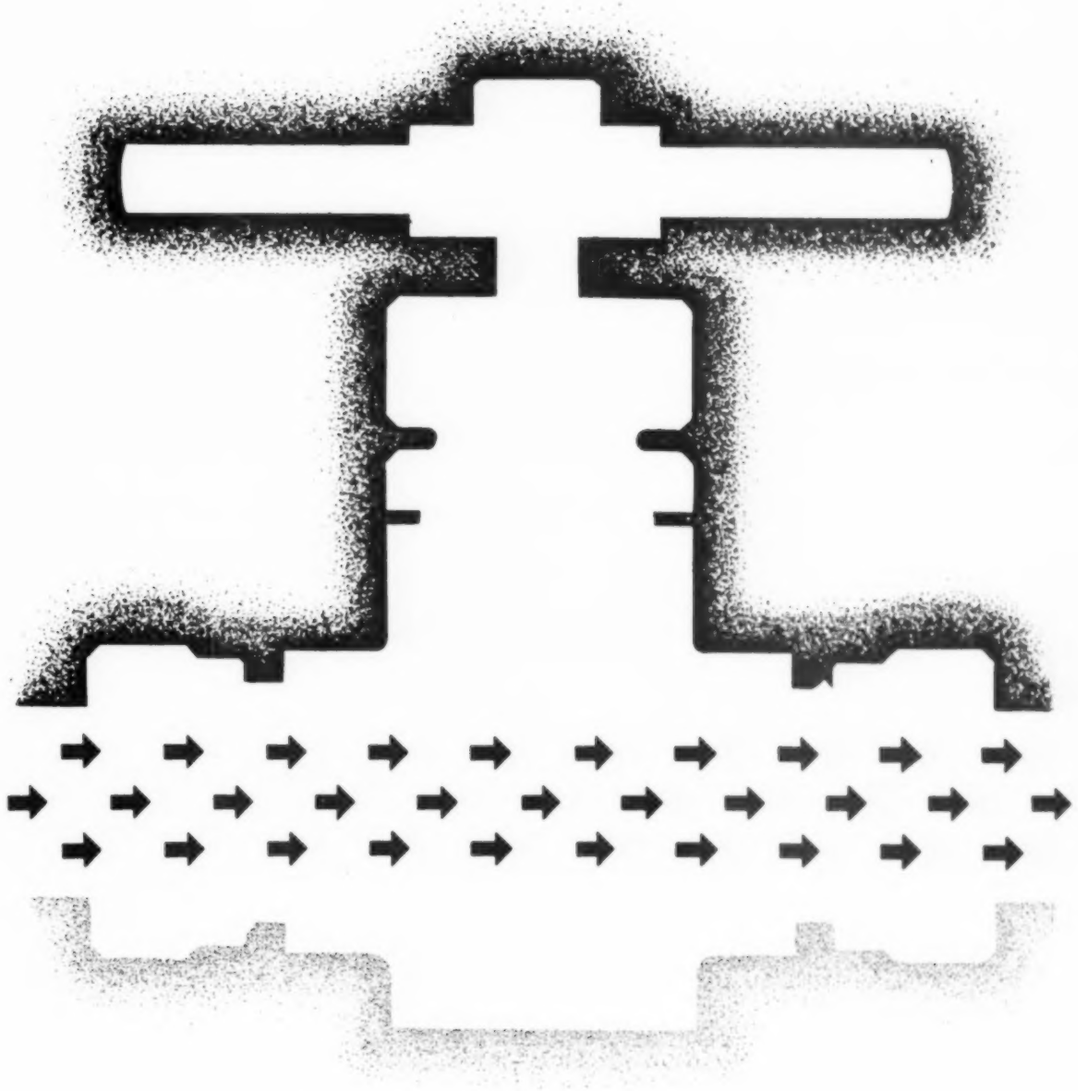
TABLE 1—Annual Consumption of Additives

	1954[47]		1958*	
	Million Pounds	Million Dollars	Million Pounds	Million Dollars
Detergents	250	50	310	70
Antioxidants and corrosion inhibitors	60	12	75	22
Viscosity index improvers	50	13	160	32
Four point depressants	5	2	30	11
Extreme pressure agents	50	13	57	16
Miscellaneous additives	—	10	8	3
Totals	415	100	740	154

* Estimated

TABLE 2—Diesel Lubricants

Year Introduced	Description	Typical Detergent Level (Millimoles per Kilogram)	Additives Used	Performance Improvements Achieved
1942	Navy Symbol 9000 oils	9	Ca or Ba phenate Ca or Ba sulfonate Zn or Ca thiophosphate	Reduced ring sticking, deposits and wear in engines using low-sulfur fuels. Satisfactory performance in submarine diesel engines.
1943	U.S. Army 2-104-B	9	Ca or Ba phenate Ca or Ba sulfonate Zn or Ca thiophosphate	Reduced ring sticking, deposits and wear in engines using low-sulfur fuels.
1948	Caterpillar Series 2 (U.S. Army 2-104-B, Supplement 2)	100	Ca or Ba phenate Ca or Ba sulfonate Zn thiophosphates	Supplied adequate protection for high output, supercharged 4-cycle diesel engines using high-sulfur fuels.
1949	U.S. Army 2-104B, Supplement 1	40	Ca or Ba phenate Ca or Ba sulfonate Zn thiophosphates	Reduced deposits and wear. Permitted longer life for unsupercharged engines using high-sulfur fuels.
1950	MIL-L-2104A	20	Ca or Ba phenate Ca or Ba sulfonate Zn thiophosphate	Same as Supplement 1 oils but for engines using low- to moderate-sulfur fuels.
1952	MIL-L-9000A, Class A (currently MIL-L-9000E)	40	Ca or Ba phenate Ca or Ba sulfonate Zn thiophosphate Silver pacifiers	Maintained adequate protection in unsupercharged diesel engines operated with high-sulfur fuels. Non-corrosive to silver bearings.
	MIL-L-9000A, Class B (recently discontinued)	20	Ca or Ba phenate Ca or Ba sulfonate Zn thiophosphate Silver pacifiers	Same as Class A oil except for engines operated with low- to moderate-sulfur fuels under snorkeling (high exhaust back pressure) conditions.
1954	Marine cylinder lubricants:			
	A. Water-in-oil emulsions	400	Ca acetate + emulsion	Permitted utilization of high-sulfur residual fuels by controlling cylinder wear to level previously obtained with conventional lubricants and distillate fuels.
	B. Colloidal suspension	400	Ca acetate	
	C. Oil soluble	400	Ca phenate	
1955	Caterpillar Series 3	150	Ca or Ba phenate Ca or Ba sulfonate	Permitted satisfactory operation under higher supercharged conditions than Series 2 oils.



In connection with high pressure

ERMETO VALVES, incorporating the famous ERMETO High Pressure Couplings are designed for use with a wide range of fluids, and are tested to one and a half times the recommended working presssure. They are available with standard Ermeto end connections. Non-standard valves can be made by special arrangement. Technical advice and fully illustrated catalogue will be supplied on request.

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The sulfur in a diesel fuel is eventually changed to hot, concentrated sulfuric acid in the environment of the engine. Most of the acid goes out through the exhaust, but some reacts with the lube oil to form a sludge which, with oxidation products, is the deposit-forming material that lubricating oil must handle. The acid also increases wear by reacting with ferrous metals.

The additives reduce deposits by several methods. One is by reducing oxidation,[148,149] and here the zinc thiophosphates as a class are effective. Alkaline additives, such as the phenates and the overbased sulfonates, reduce the adverse effects of sulfuric acid in a sacrificial manner; that is, they neutralize the acid so that it cannot react with either the oil or the engine. Another way in which the basic additives function is by neutralizing acidic products of lubricating oil oxidation.[72] Thus, when the additive reacts with a polymerizable oxyacid, the reaction product remains oil soluble because insoluble polymers cannot form.

TABLE 3—Gasoline Engine Oils

Year Introduced	Oil Type	Typical Detergent Level (Millimoles per Kilogram)	Additive Type	Performance Improvement Achieved
1948	Premium	10	Ca or Ba phenates and sulfonates Zn or Ba thiophosphates and/or P_2S_5 olefin reaction product	Reduced high-temperature deposits. Slight wear reduction. No significant effect on stop-and-go deposits.
1950	Heavy Duty	25	Same as above	Wear reduced to about half that of "Premium" oil. Small improvement in stop-and-go deposits.
1950	SAE 5W	25	Same as above	Provided for subzero starting; primarily for military use. Heavy duty level detergency. Used only in extreme winter because of poor oil mileage.
1952	Supplement 1, MS, DG, DS	40	Same as above	Small improvement in wear compared to "Heavy Duty" oil. Small improvement in stop-and-go deposits compared to "Heavy Duty" oil.
1952	SAE 5W-20	40	Same as above, plus polybutenes or alkyl methacrylate viscosity index improvers	Starting of an SAE 5W oil. Gasoline mileage 15 to 20 per cent better than SAE 30 in stop-and-go service. Oil mileage improved to better than an SAE 10W oil. Reduced octane requirement increase. Supplement 1 level detergency.
1953	SAE 10W-30	40	Same as above	Starting of an SAE 10W oil. Gasoline mileage 10 to 15 per cent better than SAE 30 in stop-and-go service. Oil mileage equal to an SAE 30 oil. Reduced octane requirement increase.
1953	SAE 20W-40	40	Same as above	Starting of an SAE 20W oil. Gasoline mileage 5 to 10 per cent better than SAE 30 in stop-and-go service. Oil mileage equal to an SAE 40 oil.
1957	SAE 5W-20 SAE 10W-30 SAE 20W-40	50	Polymeric detergent (VI improver having detergent properties). Plus above Supplement 1 compounding. Ba alkyl phosphonates Zn or Ba thiophosphates	Starting, gasoline mileage and oil mileage corresponds to above multigrade oils. Octane requirement increase same as above multigrade oils. Detergency in stop-and-go service generally improved over Supplement 1 level oils.
		0	Polymeric ashless detergent and zinc thiophosphates (no metallic detergents)	Starting, gasoline mileage and oil mileage corresponds to above multigrade oils. Octane requirement increase and preignition lower than with metallic detergent containing multigrade oils and detergency in stop-and-go service markedly improved. Wear reduced to about half that of "Heavy Duty" oil.

TABLE 4—Miscellaneous Engine Oils

Year Introduced	Oil Type	Typical Detergent Level (Millimoles per Kilogram)	Additive Type	Performance Improvement Achieved
Experimental (1950)	Compounded aviation oil	20	Lead cetyl phenate and phenyl alpha naphthylamine or Zn and Mg phenates and sulfonates	Small improvement in overall engine cleanliness. The problems that were current during these tests were solved by making mechanical changes in the engines. This development was not commercialized.
1953	Compounded light plane oil	15	Lead cetyl phenate	Reduced piston ring sticking and engine deposits. Extended engine life 60 per cent.
1958	2-cycle engine oil		Still proprietary (contains no metallic compounds)	Reduced piston ring sticking and port deposits under both hot and cold operating conditions. Reduced spark plug fouling compared to straight mineral oils and markedly reduced compared to metallic additive containing oils. Antirust protection. Stable oil and gasoline mixtures.

In spite of oxidation inhibitors and sacrificial alkaline materials, deposit precursors still form in diesel engines. Here the peptizing action of the sulfonates comes into play.

The antiwear effect of alkaline-type materials which react with the sulfuric acid instead of the engine is reasonably clear. However, many additives are far more effective than can be accounted for by the sulfuric acid reaction; and here research remains to be done.

Gasoline Engine Oils: Progress in the development of gasoline engine oils is summarized in Table 3. Highlights of this table are:

(1) The oils are quite similar to the diesel lubricants shown in Table 2; and, until recently, the same compounding materials were employed.

(2) All of the gasoline engine oils use zinc thiophosphates to provide oxidation inhibition and extreme-pressure properties. The latter are more necessary in gasoline engines than in diesels because of cam scuffing. This is because gasoline engine speeds are higher, valves open faster to improve breathing, and because gasoline engines employ far less metal than diesel engines.

(3) As with diesel lubricants, the compounding level has increased sharply during the past decade.

(4) New emphasis has been placed on the use of multigrade oils.

(5) The latest development in multigrade oils is the substitution of polymeric detergents for the viscosity index (VI) improvers and also for all or part of the conventional detergents. These oils have all of the desirable viscosity characteristics of multigrade oils—high VI and shear dependent viscosity which results in much lower engine friction. Also, they can be designed so that their wear-reducing ability exceeds that of conventional oils containing alkaline compounding materials.

The environment of the lubricating oil in a gasoline engine can be quite different than the environment in a diesel. The over-the-road condition of hot, almost steady driving is similar to that of the diesel. But stop-and-go driving is quite different. Here, the basic problem is that engine temperatures are too low, and acidic water from combustion condenses. Polymerizable materials from partially burned gasolines also accumulate in the engine. These materials are not present in diesels but are the major source of deposits and wear (when considered with the acidic condensate) so difficult to handle in stop-and-go driving.

The effect of operating conditions on engine wear is strikingly illustrated by two examples. With natural gas as a fuel and high engine temperature, almost no wear occurred during an extended test. We calculate the engine life (cylinders and piston rings) to be 12,000,000 miles. Changing to the conditions where corrosion is high reduces this to 10,000 miles.

Acid neutralization is essentially the same in gasoline or diesel engines. Therefore, the alkaline compounding materials,

Tanganyika. A Failing 2,500 test rig. BP is currently engaged in the search for new sources of oil in 6 far separated regions of the continent of Africa.

BP

such as phenates or overbased sulfonates, are functional in both types of engines. But there is one important difference. In diesels, the sulfuric acid will neutralize the additives down to a pH of about 3. But in gasoline engines the additives cease to function when neutralized to a pH of 6. One of the important advantages of the newer polymeric detergents is obtained by a mechanism, probably adsorption on metallic surfaces, that is different than simple neutralization.

Miscellaneous Engine Oils: Table 4 lists some developments in addition to diesel lubricants and automotive engine oils. These are far less spectacular but represent a field in which significant, functional improvements can be expected. The first project listed in the table was unsuccessful, because with mechanical improvements the value of the additives disappeared. The lead phenate did, indeed, improve lubricating oils for light aircraft; and this can be considered a successful development. The lead salt is of interest because its contribution to surface ignition is far less than that of the usual calcium- or barium-containing additives. The latter materials were proved to be the cause of destructive preignition in large piston engines.[77]

A spectacular improvement was achieved through the use of a new, all-organic additive for two-cycle engine oils. Additional work in this area is expected to reduce the cost and make additives of this type more widely useful.

Improved oils are also expected for natural gas engine use, but here, also, work must be done to reduce manufacturing costs.

Multigrade oils are not new. In fact, they were introduced to the market in the early 1930's. But they did not come into their present prominence until the early 1950's. The volume has now become large, representing about 25% of the total compounded motor oil volume.

Multigrade oils are considered one of the most important developments of the past decade.

One contribution has been to increase gasoline mileage, particularly on short trips where engines are cold and oil viscosity is high. On a chassis dynamometer an increase of 5% in rear-wheel horsepower has been noted. Starting is greatly improved. Engine friction is lower.

Lower engine friction can be achieved by the use of lower viscosity oils but at the expense of oil mileage.

In this regard the 10W-30 oils can be quite satisfactory or mediocre, depending upon how they are formulated. Fig. 1 is an analysis of some of the features that contribute to good mileage with multigrade oils. It will be noted that the best 10W-30 oil gave 100 per cent more lubricating oil mileage than the poorest in this figure. The progressive improvement can be achieved as follows:

Oil D to **Oil C**—Use of a more shear stable, lower molecular weight spread VI improver.

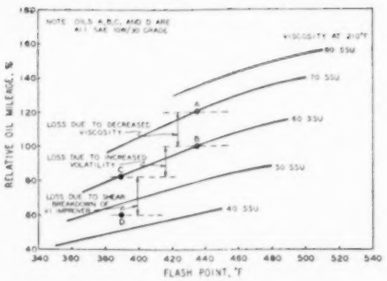

NOTE: OILS A, B, C, AND D ARE ALL SAE 10W30 GRADE
VISCOSITY AT 210°F
80 SSU
70 SSU
60 SSU
50 SSU
40 SSU
LOSS DUE TO DECREASED VISCOSITY
LOSS DUE TO INCREASED VOLATILITY
LOSS DUE TO SHEAR BREAKDOWN OF VI IMPROVER
RELATIVE OIL MILEAGE, %
FLASH POINT, °F

Fig. 1—Effect of viscosity and volatility of VI improved oils on oil mileage.

Oil C to **Oil B**—Use of a better fractionated, higher flash base oil.

Oil B to **Oil A**—Increase viscosity of finished oil to SAE 30 upper limit.

Multigrade oils differ from conventional oils in that they consist of neutrals plus heavy polymers, rather than neutrals plus bright stocks or viscous petroleum fractions. The VI improvers are giant molecules ranging in molecular weight from 100,000 to 1,000,000. This is about 1,000 times the molecular weight of petroleum oil molecules. C. W. Georgi[82] has a homely analogy which describes these oils well: "A polymer-mineral oil blend may thus be likened to a handful of spaghetti mixed into a cup of peas, the spaghetti representing the polymer molecules and the peas the oil molecules." When the polymers are added to the lubricating oil, they have a relatively greater effect on high-temperature viscosities than on low-temperature viscosities. This is because the giant molecules are random coils that swell at high temperatures and contract at lower temperatures.[80]

The high-viscosity index of the thickened oils is responsible for only a small part of their performance improvement. Most of the improvement comes from the shear dependence of their viscosities, commonly called "temporary shear"; as the shear rate increases, the viscosity decreases.

The reason for the shear dependence of the viscosities of thickened oils has not been clearly established, but it is probably because shearing forces reduce the effective hydrodynamic radii of the polymer molecules.

Besides a temporary loss in viscosity with shear rate, polymer-thickened oils suffer a permanent loss in viscosity commonly called "permanent shear." This is caused by rupture of the large polymer molecules. Their thickening power is roughly proportional to molecular weight or, more precisely, to the molecular weight to the 0.7 to 0.9 power. Therefore, a single break in the center of a polymer molecule reduces its thickening power to about half. Best results are obtained through the use of relatively high proportions of medium molecular weight polymers, with the molecular weight range kept to a minimum. This is more expensive, but it produces better oils which resist permanent viscosity loss and provide better oil mileage.

The newest development in the additive field is polymeric ashless detergents. These materials are identical to the alkylmethacrylate polymers except that 1 to 10% of the alkyl side chains are replaced by active chemical groups. Only one class has been described in the technical literature:[103] a copolymer of lauryl methacrylate and diethylaminoethyl methacrylate (90:10). Materials of this type provide all of the favorable viscosity characteristics of the conventional VI improvers and, in addition, are effective detergents under the conditions of stop-and-go city driving where conventional additives are almost ineffectual.

It has been found that ashless detergent oils reduced piston varnish demerit (10 minus rating) to 0.7, as compared to an average demerit of 3.4 for three conventionally compounded oils. Using the correlations in reference 103, this would have the effect of reducing average oil-ring clogging from 35 to 20% in 60,000 miles of taxi operation, or adding about 25% to the overhaul period of the engine.

Test Method Development: One of the most interesting and effective developments in the test methods is the use of radioactive parts for measuring wear. Parts to be tested are rendered radioactive by exposure in an atomic reactor, and the amount of wear is determined by examining the lubricating oil for the presence of radioactive material. The new method has the important advantage of speed and accuracy (reliable data can be obtained before an engine is worn out). Also, there is positive assurance that all wear is coming from the radioactive part. The method has been applied to piston rings in both two-cycle and four-cycle engines, cylinder liners, cams and followers, gears, and bearings.

The radioactive method and other improvements in test procedures are listed in Table 5. Most of these methods were developed by members of the Coordinating Research Council, Inc., an organization sponsored by the American Petroleum Institute and the Society of Automotive Engineers, Inc.

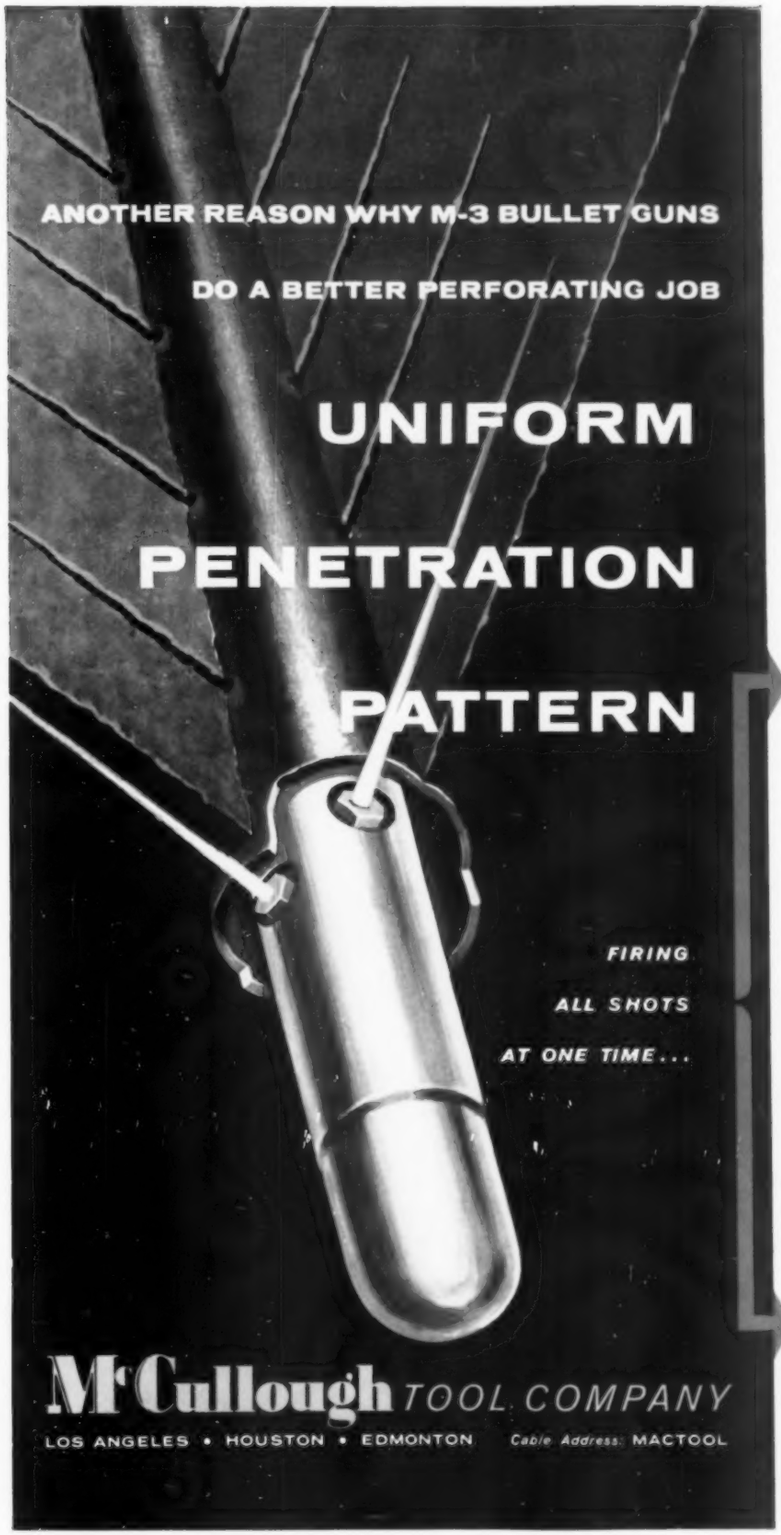
Important events of the past decade have included modification of the SAE oil classification system and the action of the API in recommending service classifications.

An API committee paper by D. W. Gow[75] has shown that it is false economy not to drain crankcases frequently. Increasing the oil drain period from 1,000 to 2,500 miles more than doubled engine wear.

Basic research has revealed that probably the major action of most detergent additives is to keep engines clean by the neutralization of oxyacids or acidic precursors of engine deposits. They also function by physical means as antiflocculants by developing electrostatic repulsion between particles and by putting a bumper around the particle to prevent its joining another.

The authors point out that much still needs to be learned about present additive detergents and that the industry now is

(Continued on page 70)

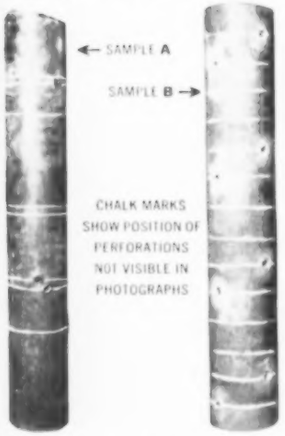


Deep, evenly spaced perforations that *uniformly* cover the productive zone – assure you of the most effective perforating job – and that's what you get when you shoot for production with McCullough M-3 Bullet Guns.

An M-3 Gun fires all shots at one time while the gun is motionless in the casing. Thus, perforations are the exact pattern of the chambers in the gun – in any shot density desired.

Combine McCullough's precise depth measurements with deep, evenly spaced perforations covering the *entire* pay zone and you get maximum drainage from formation to well bore – best possible production.

prevents bunching of shots in one small area in pay zone, giving insufficient coverage – prevents scattering of shots over a wide area, possibly missing the pay zone entirely. Sample A (actual photo of pipe recovered from well) shows the erratic shot pattern produced by a gun firing one shot at a time. As each shot is fired the upward thrust of released gases causes the gun to dance up and down.



eliminates the danger of possible pipe damage or failure. Too many perforations in one spot or in a coupling can cause pipe to part if it is in severe tension. Sample B is an actual example of six shots per foot fired by an M-3 Bullet Gun. Note the uniformity of shot pattern – no danger here of seriously weakening your casing, and you get the most productive perforating job possible.

An Announcement

Hughes Tool Company can now announce the successful development of the first practical and effective bearing seal for a rock bit that seals in a bearing lubricant and seals out drilling and formation fluids.

The results, from a long series of field and laboratory tests, have demonstrated that these lubricated sealed bearings will substantially increase bearing life and the drilling life of the bit, where bearing life has been the limiting factor.

We now stand on the threshold of another series of Hughes developments that will lead to further important drilling economies.

The drilling industry can appreciate that the development of a successful bearing seal has been difficult and costly. There is still much to be learned before we can determine the full extent of its application to all sizes and types of bits.

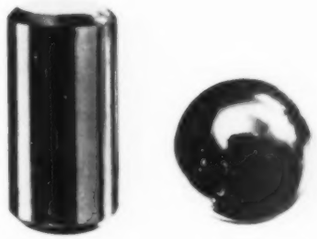
In developing the sealed bearings, we have, so far, largely concentrated on one size and on one type of the R Series insert bits. We concentrated on insert bits because we felt that the industry had the most to gain from extending the life of these bits in the hole . . . and by having them available in quantities at the earliest possible date.

A target date of January 1 has been set to have the first production sealed-bearing bits available for distribution in the type RG-1J, 8¾″ size. With regard to the other sizes in the insert series, and as to other types and sizes, distribution will be at the earliest date they can be produced, consistent with the Hughes policy of thoroughly testing each design before it is released to the field.

FRED W. AYERS
Senior Vice President and General Manager
Hughes Tool Company

40 HOURS

This ball and roller bearing were taken from a non-lubricated Hughes R-1 bit run 40 hours. They are representative of the bit's bearings.



75 HOURS

This ball and roller bearing were taken from a Hughes R-1 bit, equipped with sealed bearings, run 75 hours in the same field and under identical conditions as the 40-hour bit.

These photographs are unretouched. The irregular shadows you see in the bearings (above right) are the camera and lights reflected by the mirror-like surfaces of the bearings.

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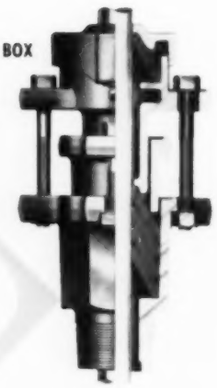

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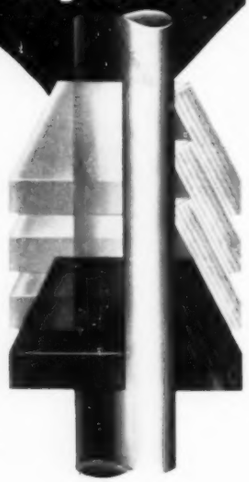

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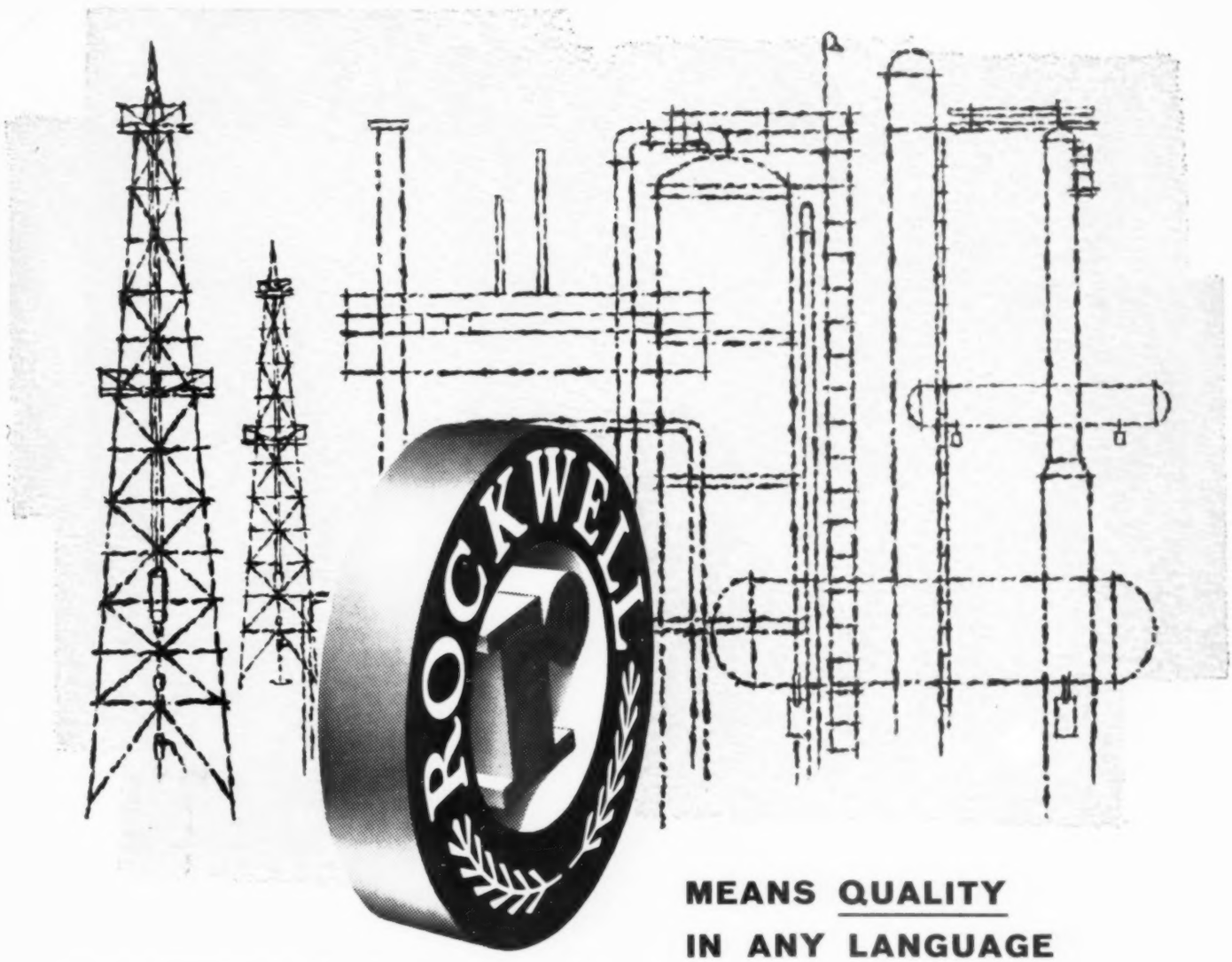

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(Continued from page 64)

advancing the use of polymeric ashless detergents "about which we know even less."

Corrosion: The first significant mechanism of copper bearing corrosion was proposed little more than a decade ago. It involves a two-step reaction wherein, for example, the lead in a copper-lead bearing must first be oxidized and then dissolved by the organic acids. The most recent work on corrosion of bearing metals shows that, under normal engine conditions and with today's oils, atmospheric oxygen is the most important oxidizing agent in the corrosion process and that the corrosion rate is determined by corrosive acid concentration.[86]

Antioxidants: The mechanism of oxidation of hydrocarbons is now rather well established. This involves initiation, chain propagation, and chain termination.[131,134,147] Commercial inhibitors have been classified into two broad types; one destroying free radicals, the other destroying peroxide molecules.[104]

The sulfur-type inhibitors most commonly used in oils act by reducing peroxides[7] and probably also by forming certain acids capable of catalytically destroying peroxides.[132] An excellent analysis of these inhibitor mechanisms, and how the different types can be combined to explain the action of synergistic pairs of inhibitors, was published recently.[116]

The authors suggested that the need for basic research in the field of viscosity index improvers lies in the field of shear.

It was pointed out that a major development has been the introduction of polar groups into V.I. improvers to impart detergent properties.

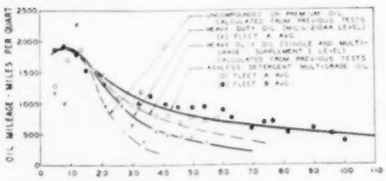

Fig. 2—Effect of lubricating oils on engine life in taxicab service.

The authors concluded their paper by suggesting the economic advantages to consumers accruing as a result of motor oil improvements.

Fig. 2 shows increases in engine life resulting from using oils containing polymeric ashless detergents. A taxicab fleet increased engine life from 28,000 to 100,000 miles.

Fig. 3 illustrates how cylinder life in a marine diesel engine may be tripled by using massive doses of additives in lubricants. The engine used residual fuel making lubrication difficult.

Money savings by using modern oils are of importance to fleet operators. A west coast public utility fleet saved $63,000 in 1,000 units by using 10-30 motor oil in 1956 as compared with using SAE 30 heavy duty oil. A fleet of 1,000 taxicabs formerly had an overhaul period of 30-40,000 miles when using uncompounded SAE 30 oil. This increased to 50-60,000 miles when heavy duty oil was adopted and jumped to 70-80,000 miles when switching to Supplement 1 Level 10W-30 oil. Gasoline trucks have made net savings in fuel of $105 per unit and diesel buses $135 per unit per year.

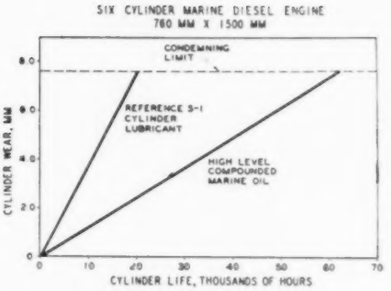

Fig. 3—Effect of lubricant type on cylinder life.

Looking to the future the authors believe it is certain that the requirements to be placed on the oils will become more difficult to meet and will probably be caused by bigger, more powerful, and more efficient engines. The anticipated changes in equipment and methods of operation and the corresponding changes in lubricating oils are listed in Table 6. In essence, the diesels will tend to require higher dosages of more potent additives. This is due to the use of turbochargers which increase severity by increasing back pressure and by more powerful engines which operate at higher temperatures. In gasoline engines the emphasis will be on lubricants for higher speed, better breathing, and more powerful engines. Quick-opening valves will require higher extreme pressure values. And with higher compression ratios, combustion chamber deposits become more critical. Therefore, the contribution of the lubricating oils to these deposits must be minimized. Because the automobile has become a necessity, and is used on the average two-thirds of the time in stop-and-go city driving, this type of operation will continue to be important. It is necessary that low-temperature deposit, wear, and rust-forming ingredients, all from the gasoline, be handled by the lubricating oil.

The new engines and the new methods of operation will supply new challenges to be met by people in lubricating oil research. We are confident that they will meet these challenges.

TABLE 5—New Testing Methods for Evaluating Lubricating Oils

Test Method	Utilization
Radioactive Wear Test	Used to measure wear of piston rings, cylinders, cams, cam followers, gears, and bearings.
L-1 (for Supplement 1)	Method standardized for MIL-L-2104A oils. Severity increased by using 1 per cent sulfur fuel.
Caterpillar 1-D (for Series 2 oils)	Severity of L-1 test increased by supercharging and use of 1 per cent sulfur fuel.
Caterpillar 1-G (for Series 3 oils)	Severity of 1-D test increased by additional supercharging of smaller engine. Lower sulfur fuel used.
Navy 300-Hour Test	Method to evaluate wear and deposits—including silver bearings.
L-4	Oxidation and corrosion of crankcase oils.
L-38	Method will replace L-4 test.
General Motors 1S-5	Evaluates extreme pressure wear properties of crankcase oils.
FL-2	Evaluates low-temperature detergency of motor oils and gasolines.
FX-3	Modification of FL-2 test—includes cycling operation.
AMA Sequence	Multipurpose engine test series to evaluate motor oils.

TABLE 6—Future Lubricating Oils

Engine or Operating Changes	New Conditions or Requirements on Lubricating Oils	Predicted Method of Accomplishment
Turbocharging of diesels to higher outputs.	More back pressure, higher ring belt temperature.	Higher additive dosages, more potency, or both.
Use of economy fuels in diesels.	No unusual oil problems.	
Use of residual fuels in diesels.	Greatly increased wear and deposits.	Improved metallurgy, more potent additives.
Higher speed, better breathing gasoline engines.	Higher loading and greater extreme pressure requirements for cams and lifters.	Higher concentrations of thiophosphates plus new, better additives.
High compression ration gasoline engines.	Octane requirement increase is more critical, surface ignition causes rumble, ash from lubricating oil harmful to both.	Use of lubricating oil additives that do not contribute ash to combustion chambers.
More low load factor, stop-and-go city driving.	More rust-forming condensate, more engine varnish and sludge from gasoline.	Antiwear additives. Antirust additives. Additives of improved "low temperature detergency."

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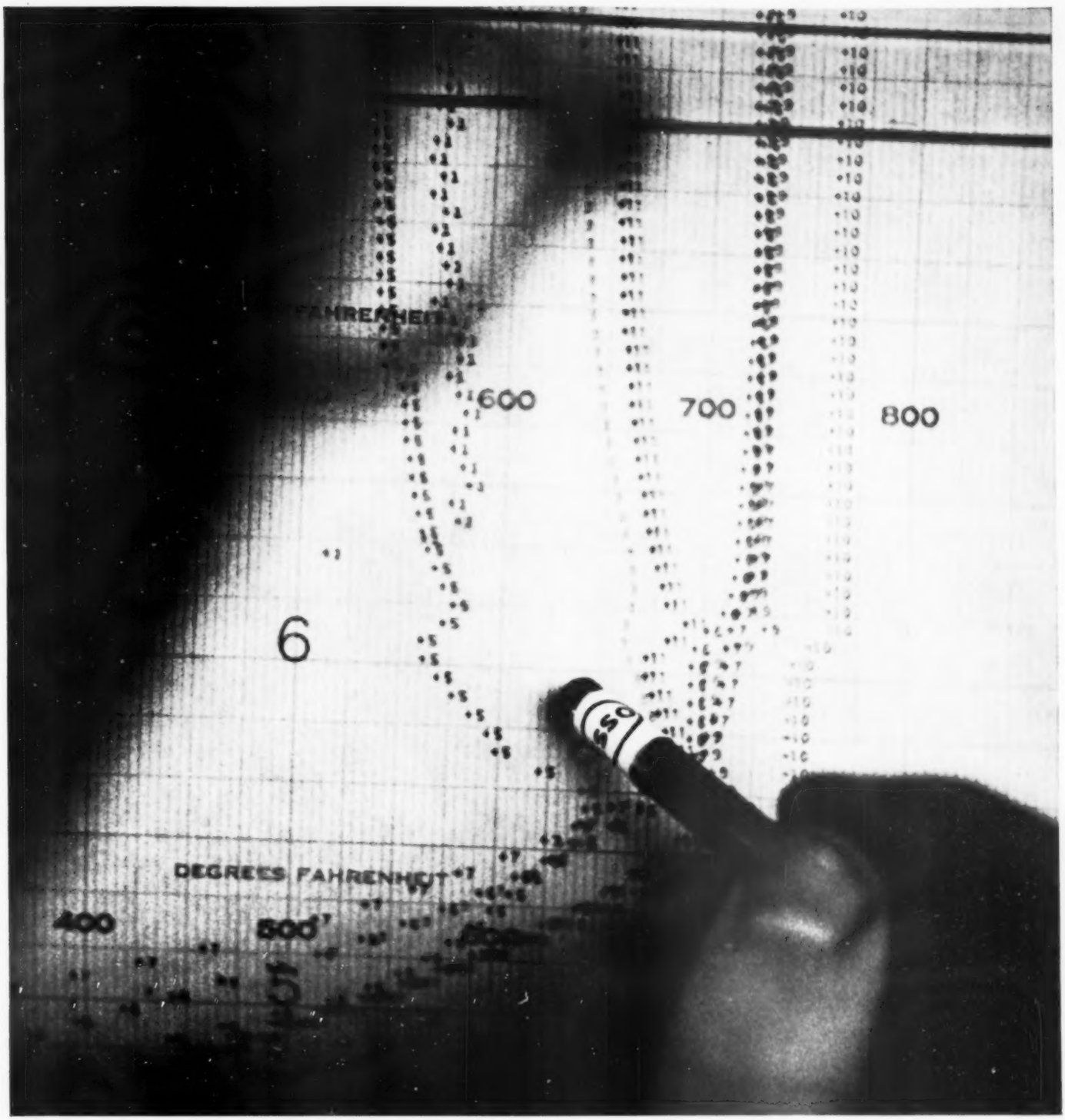

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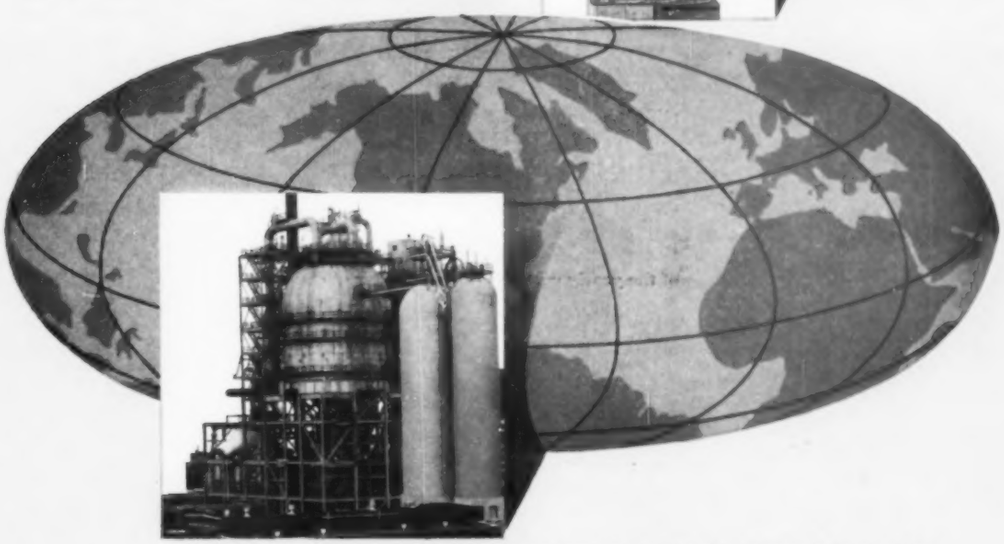

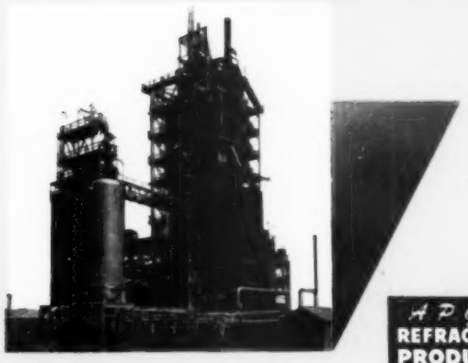

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Tanker Corrosion Problem

(Continued from page 51)

earlier indications of the serious effects of air within cargo tanks had been underestimated. Even with dehumidification equipment, the atmospheric and mechanical conditions remain the most influential factors concerning corrosion in clean oils tankers.

Protective coatings are seen by Esso Standard's J. F. Koehler as one of today's most promising methods for controlling corrosion in tanker cargo compartments. In addition to maximum protection against corrosive attack, coatings offer advantages and intangible savings not provided by alternate methods, he said.

The principal disadvantages are high initial cost and additional repair time (during application). However:

(1) Conditions peculiar to a specific vessel may sometimes justify the application of tank coatings in spite of the relatively high initial cost and additional time required.

(2) Through the use of specialized application procedures, tank coating techniques can be substantially improved, possibly to the extent that reductions in application cost and time are permitted.

(3) The increasing effective life span (beyond original estimates) of modern coating materials is helping to bring the average cost per year of protection for tank coating systems to within reasonable range of the yearly costs for other methods of corrosion control.

(4) These disadvantages are completely eliminated when coatings are applied during tanker construction. A lower coating cost is possible through easier application, and no vessel time is lost because of close integration between application and ship erection procedures.

Esso Standard's experience with tank coatings dates back to 1956, when seven cargo tanks on two clean/specialty service vessels were coated with an inorganic-zinc-pigmented material. The decision to do this was based on the satisfactory shipboard experience of Standard Oil Co. of California with the coating. Application was made on non-specialty tanks in the Esso vessels to supplement existing anode or anode-inhibitor systems.

Three years of service confirmed Esso's belief in the value of the coating method. Today, there are more than 65 completely coated compartments in seven company ships. Present indications are that a ten-year life is both realistic and possible. Tank cleaning requirements have been reduced; corrosion has been completely arrested; and greater cargo scheduling flexibility has been achieved.

A recent analysis of estimated costs for protecting cargo tanks in 27,000-dwt clean service vessels shows how full-scale, protective coating systems can be economically attractive when long term protection periods are involved (see Fig. 3).

There is a wide variety of materials available today for this type of coating. Many types of vinyls, epoxies, inorganic materials, etc., are among them. Only a few specific coatings, however, have been actually applied to cargo tanks. An even fewer number has been in service any appreciable time. The Saran Vinylidene and Dimetcote No. 3 inorganic-zinc-pigmented coatings are probably the two most widely used in cargo tanks to date. These continue to be popular because of their previous performance in service. However, Koehler believes that research and shipboard testing will bring still better coatings.

The optimum coating will combine an over-all lower cost (material and application) and improved service characteristics (longer life, better resistance to more products).

A change in washing procedure on non-ballast tanks can cut corrosion economically, according to W. G. Bolger and P. J. Naquin of American Oil Co. The use of a fresh water bottom wash with mechanical ventilation reduced corrosion by 40% over a sea water bottom wash, and reduced it by 75% over conventional sea water Butterworthing. This was accomplished at an initial expense of $4,000 per vessel and an annual operating expense of not more than $1,500 per vessel, they reported. The results of the study were based on experience with T-2 tankers, and American Oil has adopted the fresh water bottom washing on all clean service vessels in its fleet.

Borden Report

(Continued from page 41)

oil industry with that of the U.S. is unwarranted. Because of the Canadian producing industry's need to export, says Mr. Britnell, it simply cannot afford to model its policies on its United States counterpart which, he observes, has virtually lost its ability to compete in outside markets because of it policy of protection of inefficient and high cost domestic production in an effort to preserve a satisfactory ratio of reserves to production.

Among the problems which Mr. Britnell notes in the imposition of a full-fledged system of controls over oil production are these: First, the government would need a full array of import quotas. They would have to be based on "normal" market requirements. This would "freeze" the existing marketing position of the various companies, since those in the maritime provinces would have to be denied crude permitting them to invade, for example, Quebec markets. Another effect would be the need for strict price control, not only for refiners but ultimately to wellhead, thus isolating the Canadian industry from normal world changes in demand.

He concludes with the observation "let us not deceive ourselves. Montreal would be a relatively small compensation for the loss of a great export market in oil. The political and economic price would be paid by the Canadian consumer, Canadian export industries and the underdeveloped countries —some of them sterling area countries— from which our present oil imports are drawn." END

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M 203 B	3 / S	54— 96	750—1200	5 1/2	8 1/4	591.9	2150
M 204 B	4 / S	72— 126	750—1200	5 1/2	8 1/4	789.0	2715
OM 636	4 / S	17— 35	1500—3000	2 15/16	3 15/16	107.8	495
OM 312	6 / S	47— 77	1500—2400	3 9/16	4 3/4	279.5	990
OM 321	6 / S	55— 94	1500—2600	3 3/4	4 3/4	311.2	1025
OM 315	6 / S	80— 124	1200—1800	4 1/16	5 1/2	505.0	1875
OM 326	6 / S	97— 155	1200—1800	5 3/64	5 1/2	660.0	1720
MB 846 A	6 / S	114— 250	750—1500	5 7/8	7 1/2	1230.2	3860
MB 846 B	6 / L	114— 250	750—1500	5 7/8	7 1/2	1230.2	3970
MB 846 Ab[1]	6 / S	148— 320	750—1500	5 7/8	7 1/2	1230.2	4080
MB 846 Bb[1]	6 / L	148— 320	750—1500	5 7/8	7 1/2	1230.2	4200
MB 846 Ad[2]	6 / S	148— 320	750—1500	5 7/8	7 1/2	1230.2	4200
MB 836 B	6 / S	230— 350	1000—1500	6 7/8	8 1/16	1806.3	4380
MB 836 Bb[1]	6 / S	305— 500	1000—1500	6 7/8	8 1/16	1806.3	4830
MB 836 Db[3]	6 / S	370— 650	1000—1500	6 7/8	8 1/16	1806.3	5050
MB 820 B	12 / SV	460— 700	1000—1500	6 7/8	8 1/16	3612.6	6180
MB 820 Bb[1]	12 / SV	610—1000	1000—1500	6 7/8	8 1/16	3612.6	6900
MB 820 Db[3]	12 / SV	770—1350	1000—1500	6 7/8	8 1/16	3612.6	7240
MB 837 A	8 / SV	165— 440	850—2000	6 1/2	6 7/8	1825	2940
MB 837 Aa[1]	8 / SV	240— 550	850—2000	6 1/2	6 7/8	1825	3020
MB 839 Ab[1]	16 / SV	1145—1800	1000—1500	7 1/2	9 1/16	6380	11020
MB 839 Bb[3]	16 / SV	1380—2350	1000—1500	7 1/2	9 1/16	6380	11450
MB 518 [1]	20 / SV	3000	1720	7 5/16	9 13/16	8201.5	10550

S = vertical; L = horizontal; V = vee type; [1] = supercharged; [2] = supercharged and with boost intercooling
[3] = with high boosting and boost intercooling.

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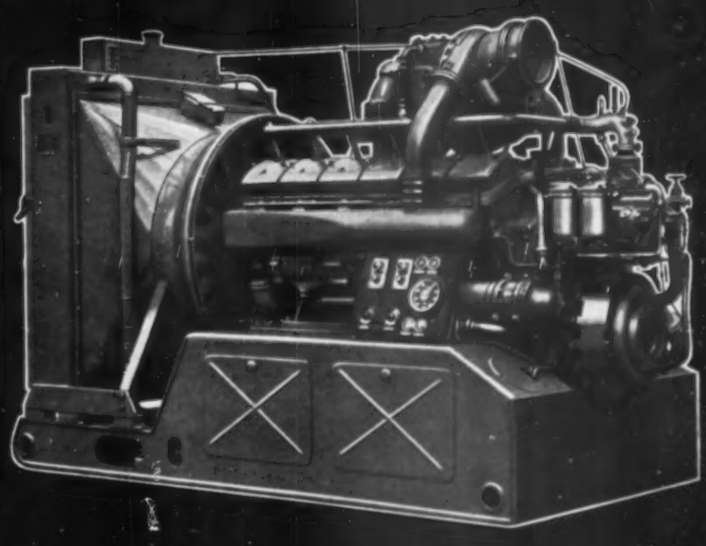

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Serial No.1878-Size BL 20.

We are in receipt of your kind enquiry dated August 5,1958 regarding the working condition of the above blower and motor which were purchased by The City Ice & Cold Storage Co, Madras,2 sometime in 1937. Accordingly we take pleasure to report to you and certify as under:-

1. Ever since the installation in our factory the above blower and motor in 1937, that is for nearly 21 years now, the blower has given us perfect satisfaction without any complaint whatsoever.

2. During this long period of 21 years we never had an occasion to open even a bolt or nut for the purpose of cleaning the machine for for the purpose of looking in for any unsatisfactory working.

3. Beyond greasing the bearings regularly once every three months no further attention was ever needed of us; and no repairs, removal or replacement of any single part has been made.

4. The blower has been working all the 24 hours of the day for 9 months in the year, and for the rest 3 months it works 12 hours a day.

5. The blower and the motor (direct coupled) continues to be in the same original form since its installation in 1937 and we have never come across an efficient and long standing blower similar to this anywhere in the market.

6 Last but not the least, we strongly recommend this blower to ice manufacturers all over the world because it is very efficient, long standing and very economical in use.

Regarding the actual pictures of the unit in operation, we shall be attending to this aspect and send you photo copies in due course.

Thanking you for your kind enquiry,

Yours faithfully,
Hariman K. Irani
(Hariman K.Irani)

047 भार्ड्लन्*

without a single repair and still going strong!

* miles.

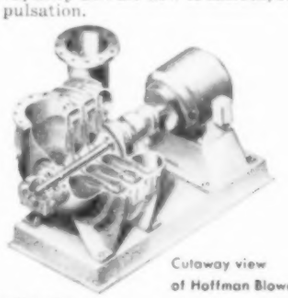
In many manufacturing plants, profit margins are dependent on a number of variables. Perhaps the most significant of these is the cost of materials, labor and *down-time*.

Output up-costs down

Where operating and production schedules depend on the unfailing delivery of clean, dry air or gas at constant pressure, Hoffman Multistage Centrifugal Blowers and Exhausters actually reduce costs, save materials and are free of down-time. For example, the Hoffman Blower pictured here has been in daily use for *22 consecutive years* without the need for repairs of any kind. Despite rugged climatic conditions, it runs its regular schedule of 24 hours a day nine months of the year and 12 hours a day the remaining three months. Over the 22 year period, it is estimated that the unit's impellers have traveled the equivalent of 395 trips to the moon and back, a distance of more than 189,017,047 miles.

Efficiency with economy

Economical operation with Hoffman Million Mile Blowers and Exhausters is assured since power is consumed only in proportion to the actual volume of air or gas handled. The absence of internal wearing surfaces and the lubrication of bearings in outboard mounted housings makes contamination of air or gas impossible. Pressure differential remains constant throughout the range of capacity and air flow is smooth, free of pulsation.



Cutaway view of Hoffman Blower.

Applications

The many production processes for which Hoffman Blowers and Exhausters provide clean, dry air or gas at constant pressure include:

- air squeegee for continuous liquid removal
- vacuum cleaning
- pneumatic conveying
- continuous drying operations
- agitation of plating solutions
- sewage and industrial waste treatment
- ore flotation
- oxidation of oil and asphalt
- combustion
- glass blowing
- raw water ice plants
- production washing of foods
- circulation of liquids
- gas blowers and boosters
- yarn drying
- wrapping, packing and stacking machines
- ejection of stampings from continuous punching machines

Free service

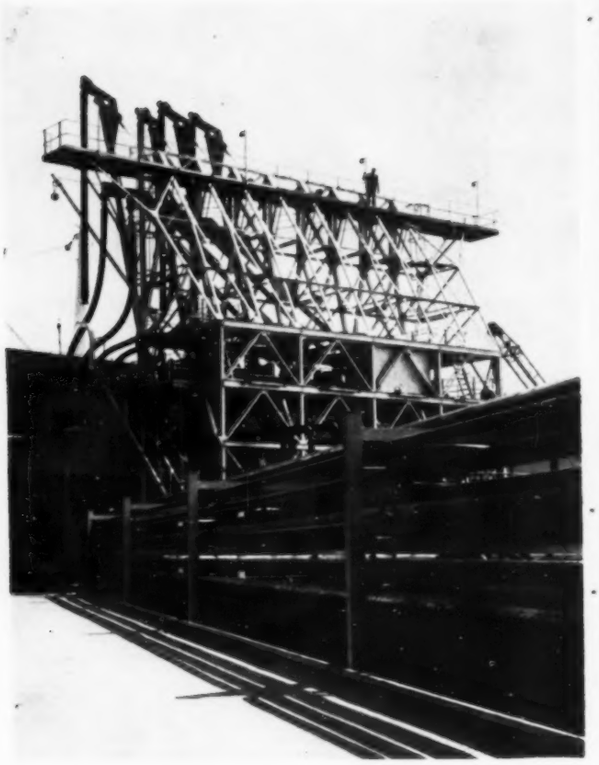
Hoffman Blowers and Exhausters are available in many standard sizes to meet the toughest service demands. Without cost or obligation, Hoffman engineers will provide objective recommendations on units to help reduce costs and boost profits in your plant. Send now for free brochure AB 104.

U.S. Hoffman Machinery Corp.
Air Appliance Division
103 Fourth Avenue
New York, New York

Occasional greasing was only servicing required in 22 years continuous operation.

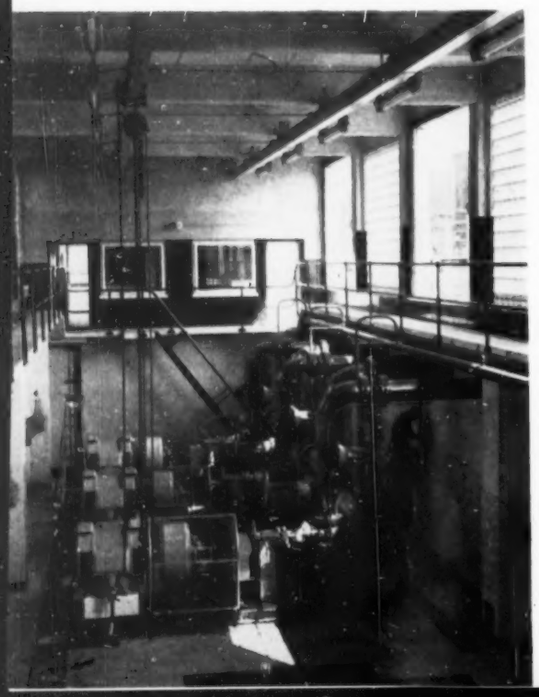
A view over the central forward portion of the vast oil storage installation at Thames Haven—probably the largest of its kind in the world.

Thames Haven expanding largest European oil storage depot



Electrically-operated high capacity hose handling equipment at No. 10 jetty, Thames Haven, Essex.

Interior of the new West End electric pump house at Thames Haven, Essex. The pumps are two-stage electrically-driven centrifugals capable of delivering viscous oil at more than 500 tons per hour.



THE Thames storage installation built up by London and Thames Haven Oil Wharves Ltd. since 1898 is today the largest indepedendent oil storage installation in Europe, and possibly the largest of its kind in the world. The developed area now covers over 400 acres, with a further 150 available for expansion and, as a result of recent development work, the installation today has a capacity of 1,750,000 tons and more tanks are under construction. According to Lord Latymer, chairman of the company, out of the total United Kingdom refined oil imports of 47 million tons in 1958, Thames Haven handled 11.2% or some 5¼ million tons.

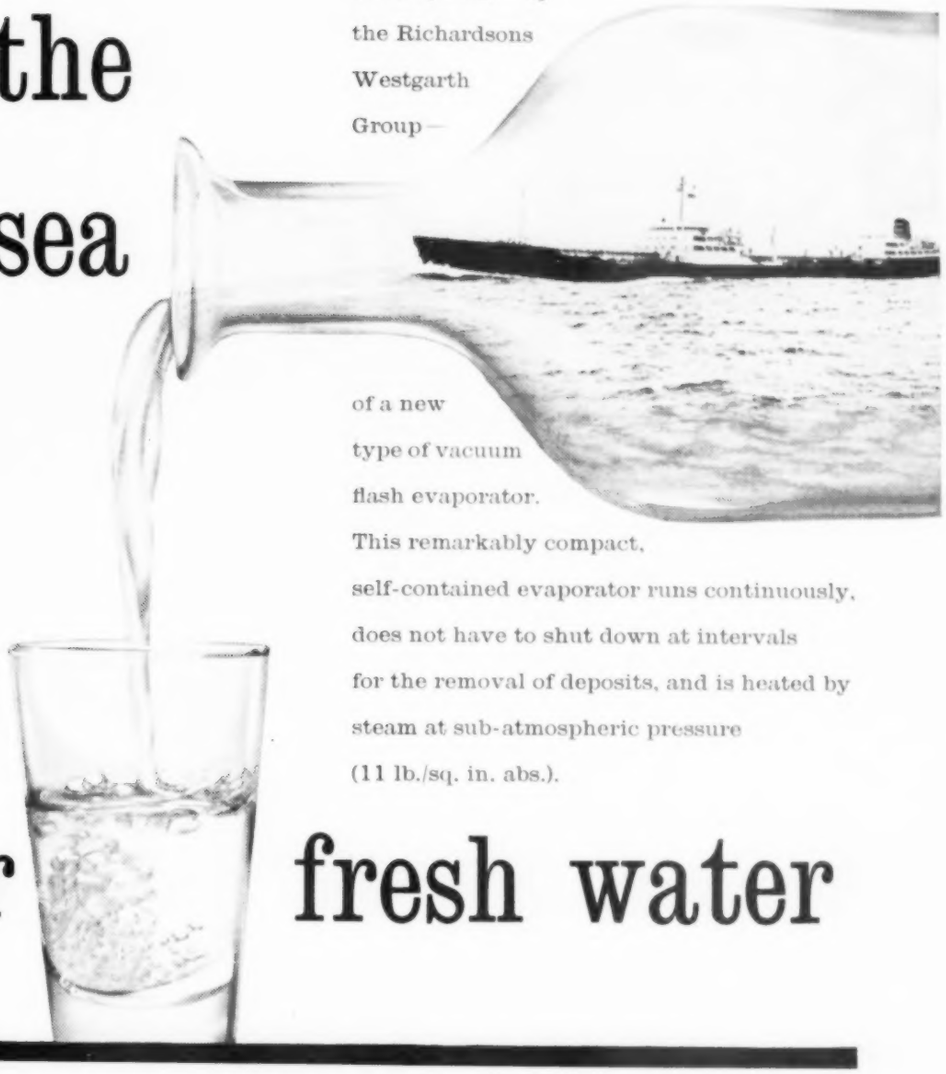
A recent visit gave an opportunity to see something of the expansion and modernization already completed and of the work still in progress. Heart of the current changes is the first of the new electric pump houses, built subsurface to ensure flooded suction to the pumps. This represents the initiation of an extensive electrification scheme which will take two years to complete. At this first station three Hayward Tyler centrifugal pumps driven by Metrovick motors are so far installed, capable of delivering viscous oil at over 500 tons an hour while absorbing 250 bhp. Three more pumps are to be installed to give a total pumping capacity to 3,000 tons an hour. Manifold pits are all of the latest design, assuring complete segregation of all products handled.

Another seven electric pump houses are to be built under the current modernization program. A limited number of steam-driven pumps are still in use but these will be replaced gradually.

Pipeline diameters are being increased, up to 24-inch, to accommodate today's necessity for faster pumping rates and quicker tanker turnaround. A new elevated pipeline is being built along the entire length of the waterfront, linking all the jetties. Altogether, nearly 10 miles of 6-in. to 24-in. lines with an additional nine miles of various inland lines have been installed to complete the system throughout the installation —which now totals over 150 miles. Those handling heated oils are aluminum-sheathed, steam-traced and lagged, and a second stage in the heat-conservation program has recently been undertaken—the

To the sea for fresh water

The idea of getting fresh water from the sea by evaporation is not new, but the ability to do so simply and economically dates from the development — by the Richardsons Westgarth Group — of a new type of vacuum flash evaporator. This remarkably compact, self-contained evaporator runs continuously, does not have to shut down at intervals for the removal of deposits, and is heated by steam at sub-atmospheric pressure (11 lb./sq. in. abs.).



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THE NORTH EASTERN MARINE ENGINEERING CO. LTD. — RICHARDSONS WESTGARTH (HARTLEPOOL) LTD.
PARSONS MARINE TURBINE CO. LTD. — THE HUMBER GRAVING DOCK & ENGINEERING CO. LTD.
GEORGE CLARK & NORTH EASTERN MARINE (SUNDERLAND) LTD. — RICHARDSON WESTGARTH ATOMIC LTD.
ASSOCIATED COMPANY : ATOMIC POWER CONSTRUCTIONS LTD.

RICHARDSONS, WESTGARTH & CO. LTD., WALLSEND, NORTHUMBERLAND, ENGLAND *and at 58 Victoria Street, London, S.W.1*

complete lagging of storage tanks for heated oils. For the light products the new tanks recently built and building by W. Neill & Sons (St. Helens) Ltd. will have floating roofs or neoprene seal roofs.

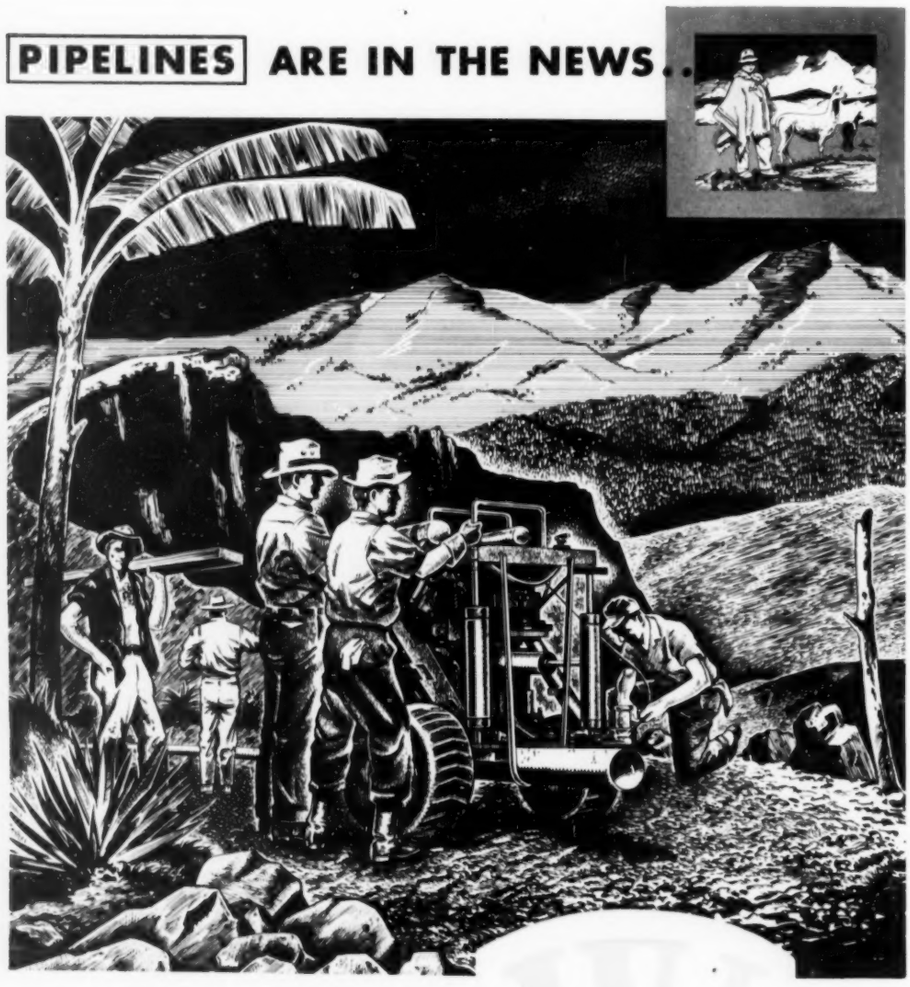
The main boiler-plant is designed to give 75,000 lb/hr of steam at 160 psi and 500°F. Fitted with pressure jet fuel oil burners, superheaters and economizers, together with extensive new instrumentation, a maintained efficiency of around 73% is obtained. This is said by the company to be one of the highest efficiencies for this type of boiler installation in the U.K. Water is chemically treated to prevent scale formation and smoke emission is controlled by a density recorder and an alarm system. With the three standby boiler stations, a total of 170,000 lb/hr can be supplied.

An installation nearing completion is a fully-automatic central road car loading stand to cater for the increasing fuel oil demand. This has remote-controlled pumps and is fed from thermostatically-controlled heated tanks. When completed it will be possible to load 16 vehicles at once at a rate of 400 gpm and with a preset meter accuracy of 0.1%. The entire loading operation, which should not take over 10 minutes for the largest vehicle, will be controlled from a central office, which will send the necessary documents to the stand-by pneumatic tube. It is anticipated that initially some 90 vehicles an hour can be loaded and provision has been made for adding another 16-bay stand.

Thames Haven's deepwater frontage extends for 1¾ miles, and on an average 60 to 70 ocean tankers are handled a month in addition to hundreds of coastal vessels and barges. Two new jetties have been completed in recent months and today there are seven deep-water jetties and six coaster and barge berths.

A striking feature of the new jetties are the electrically-operated Woodfield boom structures with high-capacity hose-handling equipment and all the latest operational aids. Tankers can now be loaded or discharged within 24 hours at rates up to 3,500 tons an hour regardless of the state of the tide. Today 47,000-tonners berth frequently at Thames Haven, and full provision has been made for tankers up to the size of the "Queen Mary"—85,000 tons.

The visit afforded clear evidence of the fact that Thames Haven, apart from being probably the largest independent oil storage installation in the world, is rapidly becoming fully equipped to meet the higher standards of speed and accuracy required in oil handling and distribution today. After 61 years of existence, London and Thames Haven Oil Wharves Ltd. can justly claim to be continuing to serve the needs of all companies in the British oil industry in a unique manner. END



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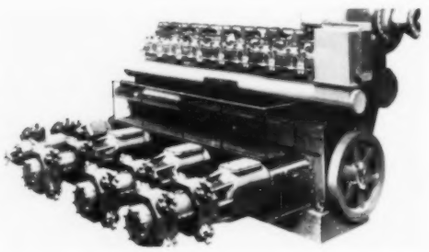


Compressors Redesigned

Clark Brothers Co. has resdesigned its HRA-T intermediate horsepower range compressors adding turbochargers and heavy duty construction. The crankcase, bed section, pistons, crossheads and running gear have been made larger and more rugged to handle the heavier horsepower load.

White Eagle Changes Name

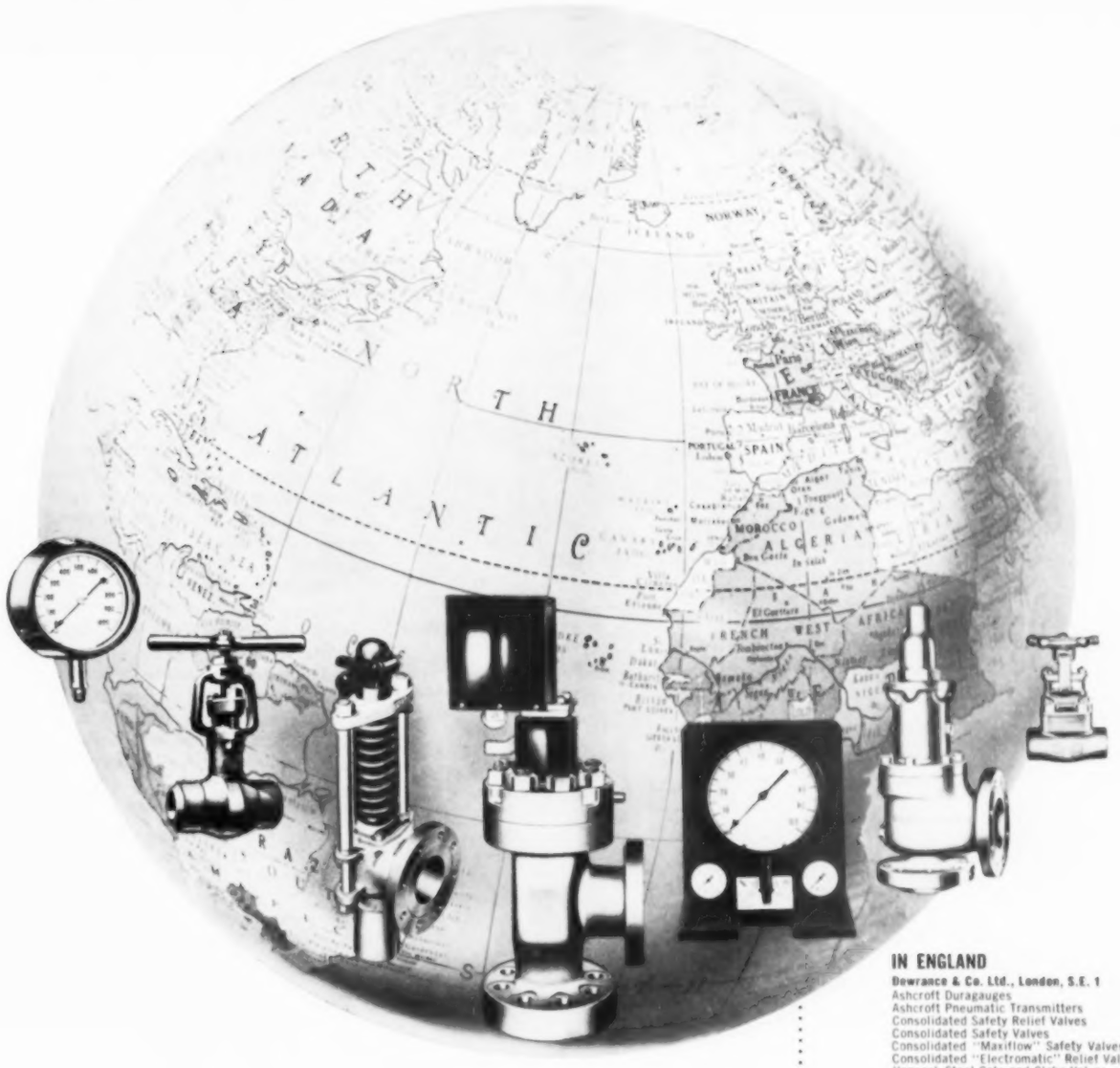
White Eagle Oil Co., Tulsa, has changed its name to Helmerich & Payne, Inc., the name of a principal operating division of the company in recent years.

Oil Recovery Symposium

A symposium on oil recovery techniques will be conducted at Corpus Christi, Texas, on October 29 and 30 by the local chapter of the Society of Petroleum Engineers of the AIME and the Texas Petroleum Research Committee. A group of 14 papers will be presented during the two days. Most will deal with special problems in Southwest Texas.

New Tanker Study

OIL TANKER ECONOMICS, by Robert S. Nielsen. 276 pages, plus graphs. A study of the development of the tanker industry from beginning to present date with some forecasts. Unusually complete and clearly written, valuable for tanker information and accurate within that range but should be used with caution when it delves into other phases of oil operations. Available from: Weltschiffahrts-Archiv No. 7 "Oil Tanker Economics," Osterdeich 27. Bremer 1, Germany. Cost is 28.40 Deutsche Marks plus postage and packing expenses.



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High standards of quality and performance have long been responsible for the frequency with which our products are specified by the petroleum industry in the United States, Canada and Latin America.

Now the same efficient gauges, safety and safety relief valves, pneumatic transmitters, and steel valves are being produced in England, France, Belgium, Western Germany and Italy by companies well-known for precision manufacture. These licensees help to assure global availability of quality products bearing our brand names, *with payment acceptable in the currencies of those countries.*

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Consolidated "Electromatic" Relief Valves
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Microsen Electronic Process Controls

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Consolidated Safety Valves
Consolidated Safety Relief Valves
Hancock Steel Gate and Globe Valves
Hancock Steel "Flocontrol" Valves
Microsen Electronic Process Controls

IN BELGIUM

Ateliers Jaspar, S.A., Liege
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Consolidated Safety Valves
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Societa Carraro & Co., Milan
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World crude production declines in third quarter of '59

WORLD CRUDE-OIL PRODUCTION
(Barrels Daily)

	1959 1st Qtr.	1959 2nd Qtr.	1959 3rd Qtr.
United States	7,201,666	7,186,333	6,828,000
Canada	540,326	463,093	505,333
Mexico	267,803	270,100	271,100
TOTAL NO. AMERICA	8,009,795	7,919,526	7,614,433
Argentina	126,978	128,000	129,500
Bolivia	7,954	8,764	8,700
Brazil	63,000	64,000	69,500
Chile	16,354	17,100	17,400
Colombia	139,584	144,705	145,000
Cuba	542	600	550
Ecuador	7,918	8,100	8,000
Peru	48,744	50,000	51,000
Trinidad	109,138	110,273	111,000
Venezuela	3,016,762	2,694,321	2,540,000
TOTAL SO. AMER. & CARRIB.	3,537,912	3,225,863	3,080,650
TOTAL WEST. HEMISPHERE	11,547,707	11,145,389	10,685,083
Austria	45,400	45,300	44,100
France	27,800	28,745	29,500
Germany (West)	91,400	91,200	99,400
Italy & Sicily	31,000	30,800	31,000
Netherlands	32,400	32,400	32,000
United Kingdom	1,700	1,700	1,700
Yugoslavia	10,100	10,100	10,100
TOTAL WESTERN EUROPE	239,800	240,245	247,800
Algeria (OCRS)	12,522	15,445	19,100
Angola	800	800	800
Gabon	12,507	13,993	14,700
Morocco	1,701	1,868	1,900
Nigeria	6,600	6,600	6,500
TOTAL AFRICA	34,130	38,706	43,000
Albania	9,000	9,000	9,000
Czechoslovakia	5,900	5,900	5,900
Germany (East)	800	800	800
Hungary	14,100	14,100	14,100
Poland	3,700	3,700	3,700
Romania	231,400	231,100	231,250
USSR	2,327,000	2,530,000	2,650,000
TOTAL USSR & SAT.	2,594,500	2,794,600	2,914,750
Bahrain	45,304	45,088	45,000
Egypt	65,000	64,000	65,000
Iran	855,023	930,336	902,000
Iraq	801,362	811,530	830,000
Israel	2,500	2,500	2,500
Kuwait	1,368,846	1,430,000	1,390,000
Neutral Zone	109,135	115,599	122,000
Qatar	172,929	169,877	170,000
Saudi Arabia	1,088,518	1,059,989	1,060,000
Turkey	6,001	7,144	7,500
TOTAL MIDDLE EAST	4,514,618	4,637,056	4,594,100
British Borneo	104,000	104,000	104,000
Burma	10,500	10,500	10,500
China (Communist)	40,000	40,000	40,000
India	8,900	8,900	8,900
Indonesia	340,000	340,000	341,000
Japan	7,600	7,600	7,600
New Guinea	5,100	5,100	5,100
Pakistan	9,996	9,800	9,800
TOTAL ASIA & AUSTRALASIA	526,096	524,900	526,900
TOTAL EASTERN HEMISPHERE	7,909,144	8,235,507	8,326,550
WORLD TOTAL	19,456,851	19,380,986	19,011,633

THE third quarter of 1959 saw the year's downward trend in the crude production continue, with a decline of about 2.3% under the world's first quarter production this year. At 19,011,633 b/d, however, the third quarter of 1959 was still considerably above 1958's average daily production of 18,133,011 barrels. None of these figures include natural gas liquids. The third quarter figures contain some estimates.

The most outstanding trend in the figures was North Africa, where daily production in the Sahara rose to 19,100 barrels. All of this was taken out of the rough country surrounding the Hassi Messaoud field via a small pipeline that leads to a railway and then shipped by tank car to the coast. Production will rise sharply before the end of this year, because a 24-inch pipeline has been completed from Hassi Messaoud to the coast and will be in operation soon.

As usual, a decline occurred in the Western Hemisphere, while the Eastern Hemisphere continued its increase. The United States and Venezuela brought down the Western Hemisphere average with substantial declines, although United States production benefits from import protection. Venezuela's production is in its seasonal slump when summer reduces the use of heavy residual oils which are often used in heating.

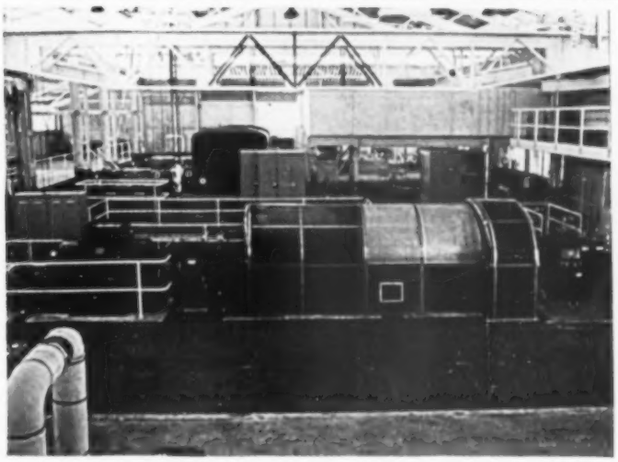
In the Eastern Hemisphere Austria continued its crude production decline, while most of the other countries of Europe remained about the same. Germany more than made up for the decline in Austria by a substantial increase which put her over the 100,000-barrel mark for the first time in May of this year.

The Soviet Bloc has made surprising strides this year. Production in the Soviet Union is rising more rapidly than even the Soviets predicted and the 1959 output will be about 2,600,000 b/d, if the increase continues at the same rate, for the highest annual rate of increase recorded in the Soviet Union. The first half of 1959 averaged about 2,468,000 b/d, compared with about 2,260,000 b/d in 1958.

Canada is expected to raise its production during the coming months to conform with the recommendations of the Borden Commission, which recently put the rise needed at 200,000 b/d by 1960. Alaska is now producing about 650 b/d from Richmond's discovery. END

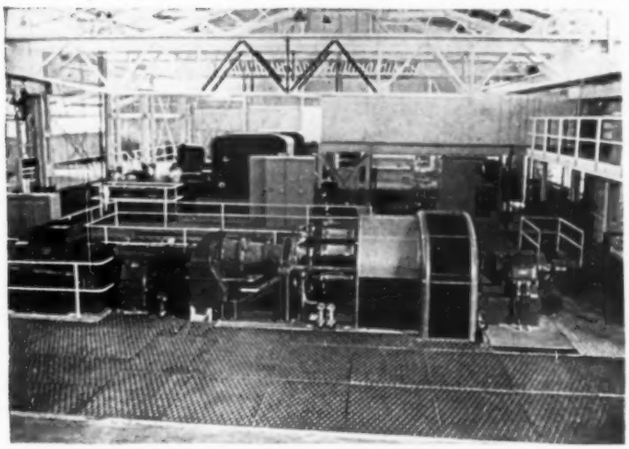
AEI

1750 kW GAS TURBINE-GENERATOR



The gas-turbine with all cleading in place.

Over 19,000 Hours Base Load Service



The same unit with part of the cleading removed to show the combustion flame-tubes.

IN VENEZUELA

The 1750 kW gas turbine-generator, on base load service in a Shell oilfield near Maracaibo, Venezuela, has completed more than 19,000 hours running on natural gas from the oilfield.

It is a typical example of the Series L axial-flow industrial gas turbines manufactured by A.E.I. Turbine-generator Division for electrical generation and mechanical-drive applications, with ratings between 1750 kW and 22,000 kW.

Units of 4000 kW and 4500 kW are being supplied to oilfields in Iraq and British North Borneo, and a similar machine is being built under licence, in Italy.

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TURBINE-GENERATOR DIVISION

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9TR

OIL COMPANY STAFF CHANGES

J. Howard Marshall

J. HOWARD MARSHALL has been elected executive vice president of Signal Oil and Gas Co. Named also as senior vice president were **CHARLES R. GAYLORD, W. T. HANCOCK, R. W. HEATH, O. W. MARCH** and **G. L. YOUNG.** All six men are now members of Signal's executive committee.

ALBERT E. ERNST was elected a vice president of Continental Oil and will be in charge of developing foreign distribution of crude, natural gas and refined products.

JOHN G. McLEAN and **L. C. PETERS,** both vice presidents of Continental Oil Co., have been promoted to new executive positions with the company. Mr. McLean, vice president in charge of coordinating and planning, has been promoted to vice president in charge of finance and transportation. Mr. Peters, formerly financial vice president, has been promoted to vice president in charge of coordination and supply.

JAMES A. RANSFORD has been named Washington, D.C. representative for Tidewater Oil Co. Ransford, an oilman for 35 years, succeeds L. W. Parsons, Tidewater's Washington representative since 1942, who retired in September.

PAUL D. BALBIN has been named general manager of Chaco Petroleum, S.A., Bolivian subsidiary of Tennessee Gas Transmission Co.

HERSCHEL Y. HYDE, Tidewater Oil Company group vice president for manufacturing, marketing and petrochemicals, has been elected a director to replace the late David S. Hecht.

J. J. TANNER has been promoted to manager of Phillips Petroleum Co.'s new Australian operations with headquarters in Brisbane. **C. D. HIER** has been advanced to chief geophysicist, and **H. H. HEIKKILA** to division geologist for the operations. Mr. Tanner joined Phillips in 1949. He served first in Denver, Colo., and transferred to Bartlesville as a regional geologist in 1956. He was foreign exploration geologist in the international department prior to his promotion to the new Australia post.

J. J. Tanner

J. H. Doores

FREDERICK R. LOOFBOUROW has been named secretary and counsel of Esso Research and Engineering Co. Mr. Loofbourow has been manager of the contract and legal staff since 1955. He joined Esso as a lawyer in 1938 after working on legal matters for other concerns in various European countries.

WINTHROP M. BARNES has been appointed assistant director—Petrochemicals—of Sun Oil Company's research and development division.

ALBERT E. ERNST has been elected a vice president of Continental Oil Co. He will be in charge of developing Continental's foreign distribution of crude oil, natural gas, and refined products, with headquarters at 30 Rockefeller Plaza, New York City. Starting with The Texas Co. in 1925, Mr. Ernst has served in Asia, Africa, Europe and South America. During World War II, he was chief, Petroleum Division, Lend Lease Administration and Foreign Economic Administration, Washington, D.C. Since 1946, he has been with California Texas Oil Co. Ltd., first as assistant to the chairman of the board and subsequently as vice president.

DONALD A. MONRO has been appointed administrator of Societe Civile Amoco, Standard of Indiana's foreign market planning office in Paris, France. He replaces **JOSEPH K. ROBERTS,** who will retire January 13, 1960. Mr. Roberts will remain in Paris until then as advisor to Mr. Monro.

E. J. McCLANAHAN, vice president and director of Standard Oil Co. of California, and board chairman of its subsidiary, Western Operations, Inc., retired recently after 47 years of service. **O. N. MILLER,** a vice president of the Company since 1954, takes the place on the Board made vacant by the retirement of E. J. McClanahan.

E. J. MC LAIN has been named assistant to the vice president of the New Orleans area, Shell Oil Co. **E. C. ABELL,** area land agent, succeeds McLain. **J. M. ROBERTS** has been named land manager of the company's Houston exploration and production area, succeeding S. A. Germany, who died July 9.

R. M. WILSON has been appointed assistant manager of the Ohio Oil Company's Casper (Wyo.) production division.

ROBERT O. GOODYKOONTZ and **J. PRINCE WARNER** have been elected vice presidents of Esso Standard Oil Co. Mr. Goodykoontz has been general manager of marketing since May of last year. Mr. Warner has been general manager of manufacturing since January, 1956.

O. A. SEAGER, formerly manager, oil operations, for Arabian American Oil Co. (ARAMCO), and recently returned to Saudi Arabia from New York, has been appointed assistant general manager, exploration. Seager will report to Paul H. Arnot, vice president and general manager, operations.

ALLAN L. PIPER has been appointed assistant manager of Tidewater Oil Company's eastern division transportation and supply department.

JOHN W. GENDRON has been appointed general manager of transportation and supply for Richfield Oil Corp.

J. H. DOORES has been elected a vice president of Esso Export Corp., international marketing affiliate of Standard Oil Co. (New Jersey). He will succeed P. C. MILLER who is retiring. Mr. Doores joined Jersey in 1944 at the Baton Rouge refinery. He transferred to the coordination and petroleum economics department of Jersey in 1953, becoming head of the coordination division concerned with economic analysis of the company's foreign and domestic affiliates.

L. B. Derby

H. T. Dodge

HARRIS T. DODGE, formerly vice president in charge of foreign operations—western hemisphere and West Africa, has been elected senior vice president in charge of Texaco's world-wide sales operations. **LANDON B. DERBY,** general manager of the department, has been elected vice president to succeed Mr. Dodge. Mr. Dodge joined Texaco in 1920, and has been manager of Texaco sales at Brussels, The Hague, and Manila. In 1956 he was elected vice president in charge of the Department.

E. A. HUGILL, JR. has been elected Secretary of Shell Oil Co. and secretary of Shell Chemical Corp., International Lubricant Corp. and Shell Canadian Exploration Co. He succeeds **J. A. HORNER** as secretary of those companies. Mr. Hugill was also appointed a vice president of Shell Development Co. and will succeed Mr. Horner as vice president in charge of the licensing division later in the year. Mr. Horner is transferring to Shell Pipe Line Corp. Nov. 1, 1959 to succeed **JOE T. DICKERSON** as president of that company, when Mr. Dickerson retires on Dec. 31, 1959.

DR. M. W. TAMELE has retired from Shell Development Co. after more than thirty years of service at the firm's Emeryville Research Center. He served as a general consultant in the fields of colloid chemistry and catalysis.

C. F. McCOY, vice president and director of Sinclair Pipe Line Co., Independence, Kans., has resigned to become vice president of Sinclair Oil & Gas Co. in Tulsa.

JAMES F. COOGAN has been appointed advertising manager for Texaco Inc. and **RAYMOND APY,** sales promotion manager. Both will report to John H. Childs, newly-appointed general manager of advertising and sales promotion.

HERSCHEL Y. HYDE, Tidewater Oil Company group vice president for manufacturing, marketing and petrochemicals, has been elected a member of the company's board to replace the late David S. Hecht.

E. T. LINCOLN has become the new vice president and assistant manager of the Sinclair Venezuelan Oil Co. replacing J. J. Quoyeser who has been transferred to Bogota as president of the Sinclair Columbian Oil Co. Max R. Guevara, Sinclair's former purchasing agent has been promoted to executive assistant to take Lincoln's place.

R. A. PRATT, manager of personnel and industrial relations for Shell Pipe Line Corp. has been appointed administrative superintendent of the Norco refinery to succeed V. G. Harrison who has been named administrative superintendent of the Wood River refinery. R. H. Hord, manager of personnel and industrial relations at Wood River, will succeed Mr. Pratt and A. J. Martin will succeed Mr. Hord. Mr. Martin is now a representative in Shell's head office industrial relations department.

T. F. SCOGGINS has been named home office public relations manager of Tidewater Oil Co. He will make his headquarters at the company's office in Los Angeles. For the past ten years Mr. Scoggins has been in the Shell Oil Co. public relations department with assignments in San Francisco, New Orleans and Los Angeles.

DANIEL M. DOHERTY has been named press relations representative of the Committee on Public Affairs of the American Petroleum Institute. He succeeds J. Richard Shaner who resigned to join Petroleum Week.

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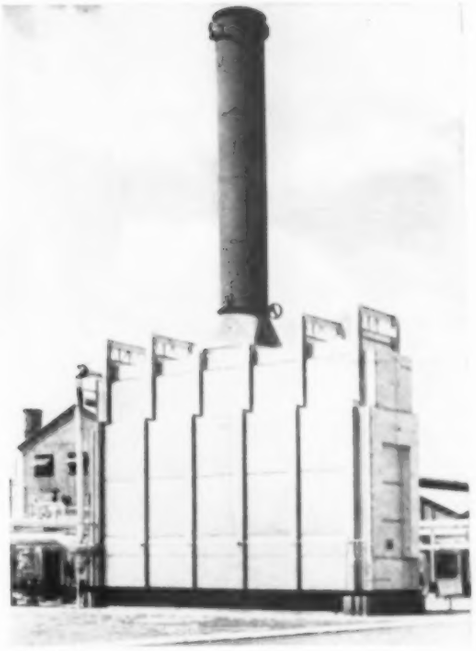
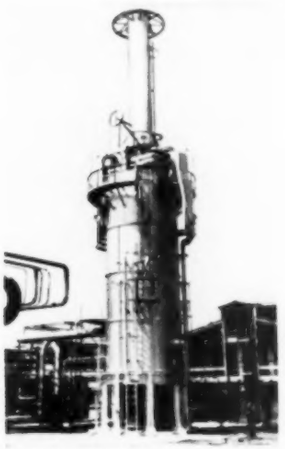


'Upflo' Heater

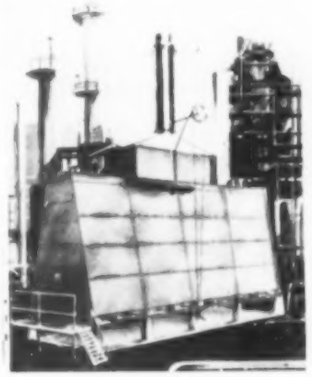
Important news for the Petro-chemical Industry: we now manufacture the full range of Born Heaters and enquiries are invited from all with special heating problems to solve. Incorporating many unique points, Born has well earned its title—"The World's Finest Heater". Developing over 85% heating efficiency, without costly blowers, fans or other mechanical equipment, heaters range from under 500,000 to more than 200,000,000 BTU per hour absorption duty. Amongst Born special features is the airtight plenum chamber, safeguarding against external explosions, insulating heater from varying wind directions and velocities and providing positive wall cooling. Flow of liquid to be heated is counter to direction of combustion gases, reducing fuel costs and providing higher efficiencies. Safety features include explosion doors on roof, safety pilots on each burner, observation ports and access doors.

For Ethylene and other processing, demanding very high temperatures, the "Bornflo" Heater is of especial interest. Suspended tube arrangement prevents sagging at extreme temperatures and exact heat control is provided by variable heating zones. Catalogues describing the full range of Born Heaters are available on request and our technical staff will supply specifications to meet all requirements.

If you are looking for higher efficiencies, lower operating costs, negligible maintenance and space economy the answer lies with the appropriate Born Heater.



Vertical Heater



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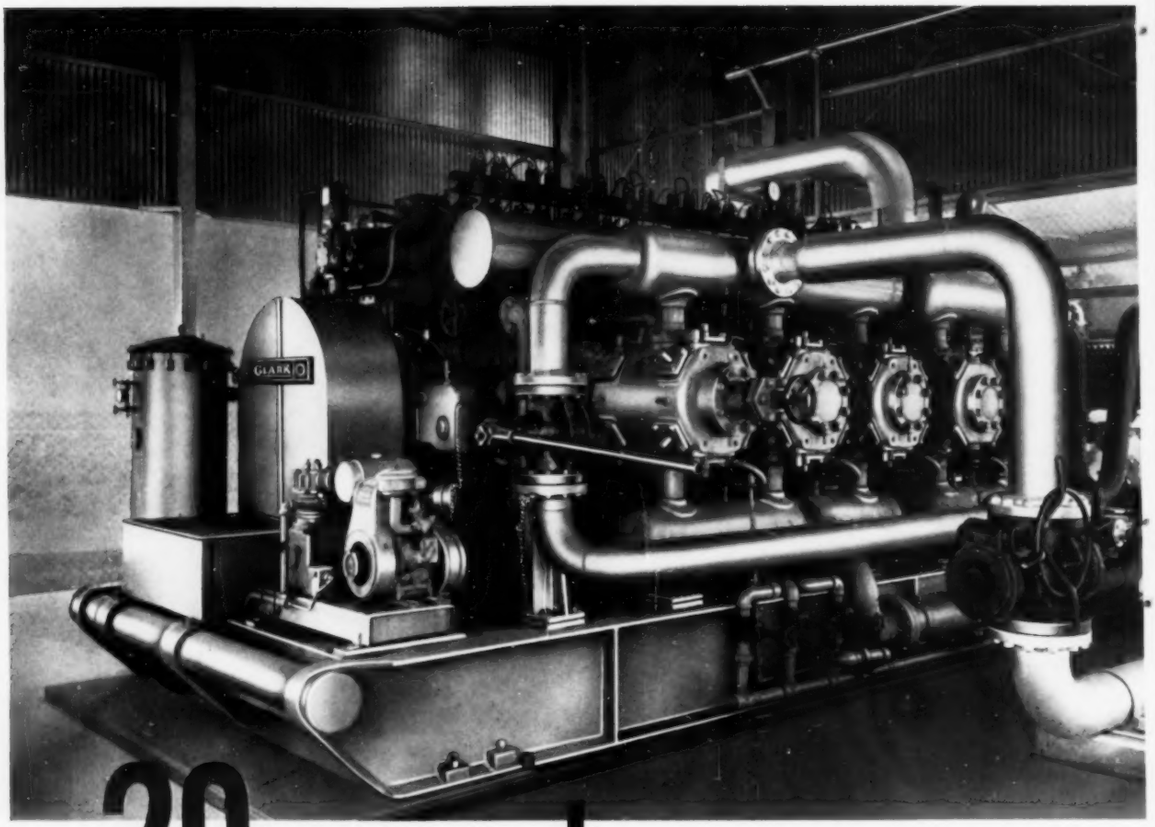

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Maximum horsepower in minimum space... that's the Clark TMB packaged field compressor. A turbocharged version of the widely used HMB, the TMB, has earned a reputation as a willing, rugged, "take-charge" type of unit that owners admire and operators love. It's not fussy about the fuel it burns and never gets cranky or unruly just when you need it most – when the going is tough.

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PERFORMANCE DATA

Permian Basin Pipeline Co. purchased the first TMB-10 manufactured by Clark and installed it in Lea County, New Mexico. After 18 months of highly satisfactory operation, here is a report on this first unit:

SERVICE PERFORMED - Field gathering station located at the wellhead.

ALTITUDE - 4100 feet. (Turbocharging compensates for hp loss due to elevation derating.)

PRESSURES - Suction---50= to 100=; Discharge---450= to 500=.

STAGES - Two-stage operation. (Can be converted to single-stage operation.)

SCAVENGING CYLINDERS - Four. One bypass cylinder.

VOLUME - Rated capacity, 4,390,000 to 5,820,000 CFD.

LOAD VARIATION - 70% to 125%.

FUEL - Untreated sour gas containing 30 grains H_2S direct from well. 1120 btu; 1.5% CO_2. (TMB can burn wide variety of field gases without detonation.)

AMBIENT TEMPERATURES - 12° to 106°.

DIRT IN GAS - Little, but considerable oil.

REDUCED SPEEDS - Operated as low as 480 rpm. with constant torque.

UNATTENDED OPERATION - Gets little attention. Unit checked only three times weekly because of protective shutdown devices.

Downtime: Negligible.

Conclusion:

TMB thoroughly proved on the job. Has great potential for variety of field applications!

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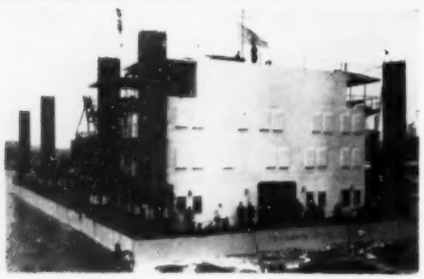
INTERNATIONAL NEWS AND NOTES



New Fao-Amaya Ocean Terminal

An event unparalleled in the records of British shipbuilding took place late July at the Wallsend-on-Tyne yard of Swan, Hunter & Wigham Richardson Ltd. The occasion was the launching of a unique "vessel", the two end section which will first be used for construction work and eventually form part of Basrah Petroleum Co.'s new deepwater Fao-Amaya terminal. This pile structure—about 28 miles south of Fao at the head of the Arabian Gulf and forming part of Basrah Petroleum's £25 million development program—will be capable of loading two 65,000-ton tankers simultaneously via submarine pipelines connected to the mainland.

The entire berth, which is the first of its kind, has been designed by Rendell, Palmer & Tritton, consulting engineers of London, who suggested a method of construction involving the De Long patents which enable the platforms to climb on their own 150-ft long caisson legs to a position of safety above the heavy seas likely to be encountered. The project is being constructed by the "Joint Venture Group" formed by the three contractors—Raymond International (U.K.) Ltd., Richard Costain (Middle East) Ltd., and De Long (Overseas) Ltd. Incidentally, Colonel De Long was present at the launching.

For the purpose of the 7,000-mile tow, due to start early August and to take about 10 weeks, the two end sections of the new terminal have been built as a single but easily-separated floating unit. On arrival this will be divided into two sections and used for driving piles, erecting steelwork, and concreting to form the large central island and two small mooring dolphins.

With this work completed, the two sections will be moved to their proper place at each end of the terminal and lifted on their De Long legs to the required height. One will become a 125 ft by 80 ft platform on which there is a 3-story accommodation building with fully air-conditioned living quarters of a high order for 60 operating personnel, and the other will form a helicopter platform and tug berth.

Says Private Capital Needed

The Minister for Steel, Mines and Fuel has stated that Walter Levy, American oil consultant, had advised the government of India that private foreign capital should be admitted to the field of oil exploration in the country.

Mr. Levy in a report to the government stated that the total effort needed in the exploration and development of oil resources in the crucial years ahead would be beyond the capacity of the Oil and Natural Gas Commission. The Minister stated that Mr. Levy's recommendations were under consideration, but no final decision had been taken so far.

Heads Argentine Operations

Joseph A. Keeling, former supervisor for Seismograph Service Corp., Tulsa, has been named manager of SSC of Argentina. His new assignment comes after 13 years on foreign assignments in Venezuela, Colombia and Mexico. He was sent to Venezuela in 1945, and was named supervisor for SSC's operations there in 1951.

New Italian Petroleum Plant

A new Montecatini 30,000 metric ton per year ethylene plant, engineered by The M. W. Kellogg Co., New York and Kellogg International Corp. London, has just been placed on stream. It is designed to produce 30,000 metric tons per year of high purity ethylene products (95% to 99.85% purity) and 15,000 metric tons per year of high purity propylene product from the pyrolysis of light naphtha or from the pyrolysis of heavy naphtha. In addition, the unit will produce the following by-products: low purity propylene, propylene-propane product, B-B product, C$_5$ product, gasoline product, quench oil product from which gasoline, gas oil and fuel oil are recovered.

Drilexco In Libya

Drilling and Exploration Co. (Drilexco) will soon begin drilling operations in Libya for Oasis, a subsidiary of Ohio Oil Co. A rig is being moved from Pesaro, Italy on the Adriatic coast for the Libyan operations. Actual drilling is expected to begin in early December. Drilexco currently has operations in Holland, Turkey, Iraq, Nigeria, and Africa.

Gas Line In India

Construction of a 120-mile gas pipeline from the GOWB Durgapur coke oven to a point opposite Calcutta is to start in December, according to Indian officials. Cost is to be about $5.3 million, payable in rupees by the West Bengal government to Yugoslavia. The Yugoslav Institute of Petroleum is to supply the pipe and other equipment and to arrange for others to supply the compression and gas cleaning plants. Officials say the Yugoslav bid of the equivalent of $130 per ton of pipe compared favorably with offers from British, German and Italian firms. Some 9,700 tons of 12.5 in. diameter pipe will be required.

Timor Wildcat

Tradewinds Exploration, Inc., and Sunset International Petroleum Corp. of Los Angeles have begun drilling of their first test well on the Portuguese Island of Timor, approximately 400 air miles northwest of Darwin, Australia. The initial well will be drilled to 7,500 feet on the Ossulari structure to test the Tertiary and Triassic formations. The second test will probably be located on the Viqueque Anticline which is about seven miles northwest of the Ossulari structure. A third test is planned on the Matai Anticline located on the western end of Portuguese Timor. Roden & McRae, of Denver, a Tradewinds subsidiary, is the drilling contractor.

Deep Well In West Australia

The German firm Preussag is drilling for Vorarlberger Erdoel G.m.b.H. the first deep well in Austria's westernmost province of Vorarlberg at Lauterach Ried, between Dornbirn and Lauterach.

Mitsubishi Plans Big Refinery

Mitsubishi Oil has submitted construction plans for a $38.5 million oil refinery to the Ministry of International Trade and Industry, to be located on a waterfront site in Kurashiki City, in Okayama Prefecture. It would have a daily refining capacity of 20,000 barrels. Completion of the first phase of construction and start of refinery operations is scheduled for March, 1961, the new refinery to supply Mitsubishi Oil's markets west of the Kansai area (Osaka-Kyoto-Kobe), which now accounts for 40% of the company's sales.

Pakistan Refinery

A group of Pakistan industrialists are seeking Japanese aid in constructing an oil refinery. The group is prepared to invest 100 million rupees in a project which would take an estimated three years to build. Pakistani private interests are also negotiating with four other foreign oil companies, Burma Oil, Shell, Caltex, and Stanvac. French cooperation has also been offered.

Gasoline Sales Rise In Germany

The rise of unbranded gasoline stations in Germany is causing unrest in the gasoline market. The number of independent stations selling unbranded gasoline has risen from 1,000 in 1955 to 3,000 at present and they now do 15% of the gasoline sales in West Germany.

The number of branded stations is about 25,000, a gain of only 4,000 since 1955, despite entry into the market of three new companies, Purfina; Total, a French company; and Caltex.

The unbranded outlets often buy their supply from tax-exempted hydrogenated gasoline from the Soviet zone of Germany or from surplus stocks of Italian refineries. Recently, they have been buying from major oil companies in Germany, as well. They sell their gasoline at retail for 55 Pfennig per liter, compared with 62 or 63 per liter at branded company-owned outlets, according to the reports.

Bobbing like a cork, the "Black Beetle" offshore platform rides out rough sea during 7,000-mile tow-voyage from Vicksburg, Miss., to its present drilling location off Sicily. The $1,000,000 platform was designed and built for the Italian government by R. G. LeTourneau, Inc., of Longview, Texas.

Italian Refining & Trade In 1958

The Ministry of Industry and Commerce has recently published official data on the overall Italian oil activities in 1958.

Refining facilities of Italy consist of 37 refineries, having a total capacity of 34 million tons/year of crude (about 630,000 bbl day). In 1958 crude run to still was slightly above 24 million tons; of the latter, 13 million have been used in the country and the remaining exported, or processed for foreign Companies.

Internal consumption of petroleum products increased 11%. Motor gasoline increased to 1,765,000 tons (+13%), jet-fuel to 210,000 tons, kerosine to 150,000 tons, gasoil and Diesel fuel to 2.1 million tons, residual fuel oil to 7.5 million tons, LP gas to 515,000 tons, and asphalt to 470,000 tons.

In the same period 7,483,308 tons of petroleum products have been exported, with an increase of 20% over 1957.

Overall storage capacity in Italy is 5.9 million cubic meters (crude and products). The greatest concentration of storage capacity is found in Lombardy, followed by Tuscany, Campania, and Sicily. Besides, 1,136 storage tanks for an overall capacity of 3.8 million cubic meters are used for lubricating oils.

Facilities for LP Gases distribution are 172, their overall volume is above 71,000 cubic meters.

Motor fuel retail units are more than 83,000: of these, 16,617 are provided for premium gasoline, 31,376 for regular grade gasoline, 15,168 for Diesel fuel and 21,581 for lube-gasoline mix for two-stroke engines (mainly motorscooters).

Of the 24 million tons of crude run to stills in 1958, 86% was from the Middle East, 4% from the U.S.S.R., 3.2% from Venezuela and the Dutch West Indies; 1,877,000 tons came from domestic sources (mainly from the Ragusa field in Sicily), a 17.8% increase over 1957.

Oil Merger In Japan

The Asia Oil Co. has absorbed Kita Nippon Oil Co. officials stating that the next move will be a merger on equal footing with Toa Oil Co. to create a major oil refining enterprise purely with Japanese capital. Mergers of smaller oil refining firms has been suggested by the government's Ministry of International Trade and Industry in recently allocating additional funds to the three mentioned concerns and to the oil department of the Nippon Mining Co. for crude oil imports.

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BRANCHES AND AGENTS THROUGHOUT THE WORLD

Japanese Seek Capital

The Finance Ministry has basically approved the induction of foreign capital by two Japanese oil firms, Maruzen Oil and Nippon Oil Refinery companies. Maruzen seeks $7 million in loans from the Union Oil Co. of California, while Nippon Oil Refinery wants to double its present capitalization of $1.1 million by issuing shares, half of which would be subscribed to by foreign capital. Finance Ministry approval must first be gained before such stock acquisition can be obtained.

Algerian Gas To Europe

The French government has named a technical commission to propose a realistic program to develop natural gas of Hassi R'Mel, which has a reserve estimated at 800 billion to 1,800 billion cubic meters. Aim is a method of piping gas first to Algiers, Oran and Bone, and later to the Rhone and Rhine valleys of France.

Production of natural gas in metropolitan France reached 1,045,800,000 cubic meters las year, a gain of 84% from 1957. Some 625 miles of trunk lines were laid, compared with 275 miles in 1957.

India's First State Refinery

Work on India's first government oil refinery at Numati (near Gauhati in Assam) has started with the assistance of Romanian technicians. The refinery is under the overall control of the Government-owned Indian Refineries Limited and is expected to begin refining oil produced in Assam by 1960.

The Romanian government, which has offered a credit to meet the cost of equipment and construction of the plant, will train 49 Indians in oil refining techniques.

New Greek Refinery

Elbyn Lubricating Oil Refinery Ltd. plans to build a new refinery at Piraeus, Greece, designed to process 300,000 metric tons of crude oil annually. George Syrenghelas, owner of Elbyn, says he has approval of the Council of Industry of the Greek Ministry of Industry, but not approval of the Minister of Industry. Construction would take 18 months. Actual production would be 180,000 metric tons of residual fuel oil, 25,000 tons of gasoline of 95/100 octane, 8,000 tons of LPGas, and 1,100 tons of oil-extraction gasoline and dry-cleaning solvent.

Elbyn presently turns out small amounts of lube oils, greases, waxes, and asphalt at its refinery at Moschato, near Athens. Syrenghelas claims in his application that Elbyn can finance the $3 million to $3.5 million cost from its own funds, and that the plant will supplement rather than compete with the recently completed State plan at Aspropyrgos.

Oil Bartered In Venezuela

A triple agreement has been made among Venezuela, Uruguay and Yugoslavia for a million dollar trade operation. Under the agreement, Venezuela will sell crude oil to Uruguay which will in turn refine it and sell the refined products to Yugoslavia, which will in turn send steel pipe to Venezuela as their part of the agreement. The information which appeared in the weekly newsletter of the Ministry of Mines and Hydrocarbons, does not specify the total number of barrels involved in the operation which will be supplied by the Superior Oil Co.

Venezuela Stops Dominican Oil

A shipment of 103,000 barrels of oil bound for the Dominican Republic was refused the necessary export permit by Venezuelan authorities on grounds that it was being destined to "an unfriendly country." The refusal followed the rupture of relations between Venezuela and the Trujillo Regime. Until now the Dominican Republic had bought an average of 500,000 barrels a year. Later in the week, oil workers' unions in this country made known that they would refuse to help any loading operations on tankers bound for the Dominican Republic.

Phillips In Australia

Phillips Petroleum Co. has sent Owen Thomas, geologist and director of exploration, and Leon Lugar, assistant controller of the company, to New South Wales where they will spend about a month.

Australian Styrene Plant

Chemicals Pty. will have a majority interest in the joint styrene venture at Altona, Victoria., A new company, CSRC-Dow Pty. Ltd. has been registered in Sydney with nominal capital of $9 million. The other shareholder will be Dow Chemical Co., of USA.

CSR Chemicals Pty. is 60% owned by Colonial Sugar Refining Co. Ltd., and 40% by Distillers Ltd., England.

The styrene venture is part of the $50 million vacuum oil petrochemical and synthetic rubber project at Altona. CSRC-Dow will manufacture styrene for use in the synthetic rubber plant as well as in the plastics industry. The CSRC-Dow plant will cost $7 million, and is scheduled for completion mid-1961.

Kuwait Feels *USA* Import Curb

USA officials feel that revenues of Kuwait will not be "affected seriously" by the new curbs on oil imports to the USA. They point out that Kuwait Oil Co. is the chief source of revenue for the country, and it stands to feel only slight loss of markets by the program, as only 73.7 million barrels of its crude-oil exports of 465 million barrels went to the USA in 1958.

KOC's exports of products will be affected more, as the company exported last year 5.7 million barrels of light distillate to the USA. If the USA market for this is virtually eliminated KOC plans to blend the surplus with its crude or fuel-oil exports or return it to the wells. KOC has no plans to reduce operation of its refinery, which has been operating at 120,000 b/d against a capacity of 190,000 b/d.

American Independent Oil Co. is in a "considerably worse" position than KOC. While only 14% of its crude exports went to the USA, 91% of its fuel oil went to the USA last year, and this is the sole marketable product of its refinery. The company must find an entirely new marketing area or severely restrict its refinery output.

Getty Oil Co. exported almost 94% of its crude and 99% of its refined fuel oil to the USA last year. A cut in exports to the USA will be reflected "almost precisely in Getty total sales." But Getty has tried to line up additional refineries in Europe, which might take some of the surplus.

Pakistan Gas Find

Pakistan Petroleum Ltd. has discovered a new reserve of natural gas at Chhatak, Sylhet district of Pakistan. The field is 25 miles north of the company's Haripur field discovery in 1955. Production tests are under way to determine whether a second well should be drilled. Standard Vacuum Oil Co., meanwhile, began drilling at its site near Borga last February.

The Haripur reserves, it has been learned, are being estimated at less than the 150 to 280 billion cubic feet first estimated. The reserves may turn out to be so small they will not provide power for the Pakistan Industrial Development Commission's Fenchuganj fertilizer factory.

Iraq Oil Committee

The *Official Gazette* of Iraq carries the text of Law No. 37 setting up a General Committee for Oil Affairs.

The committee is charged with drawing up general oil policy, which includes: supervision of present oil concessions, and amendment of the concessions; opinion on the grant of new oil concessions and taking part in laying down of such concessions or their amendment; specifications for local and imported oil products; opinion on agreements concerning oil pipelines crossing Iraq and taking part in discussions about oil pipelines; research and studies relating to oil affairs; operations for oil research, production, refining, purchase, sale transport and distribution; imports of oil products and exports of crude oil and derivatives; preparation of products for industrial uses; fixing of oil product prices; establishment and management of all various oil installations throughout the republic; production or manufacture of any matter essential to oil industry and sale; undertaking all necessary and beneficial works required for realizing the objects of the committee; raising loans within the limits prescribed by the Council of Ministers.

The committee has administrations on oil affairs, as follows: oil products distributions, oil refineries, and fields. New administrations may be set up by the committee with the approval of the Council of Ministers.

A board of administration of nine members shall oversee the committee. The chairman and his deputy and the four administrators shall be members as well as three others representing the Ministries of Finance, Development, and Defense. Committee members shall be named by the Council of Ministers for three years.

The law, effective April 1, provides for transfer to the Committee of: (1) liabilities, assets, rights, and obligation of oil installations and other government departments decided by the Council of Ministers; (2) rights and obligations of the government oil refineries administration set forth in Law No. 9 of 1952 and its amendments, which law is canceled.

Gas Find In Italy

Near Pesaro, in Marche region, Montecatini Co. has drilled a wildcat which is a good producer of natural gas. On preliminary test, daily production rates were about 100,000 cubic meters.

Drilling Offshore In Sicily

Agip Mineraria started geophysical survey in an offshore area between Licata and Gela. The ships "Oil Creek" and "Blue Creek" of the Western Geophysical Co., Los Angeles, recently shipped required material and equipment to carry on submarine tests. In Gela Bay, "Scarabeo," a LeTourneau platform acquired by Agip Mineraria, is drilling its first well, one mile off the coast.

Esso Withdraws From Italy

Esso Exploration Co., associate of Jersey Standard, has officially renounced its application for oil permits due to the discouraging Italian oil legislation. The concerning permits covered about 300,000 hectars, and were located near Lecoe, Campobasso, Foggia, Ancona, Pesaro, and Macerata. The withdrawal decision followed approval of the petroleum law of 1957, and Gulf Italia's decision to abandon activities in the Italian boot.

Austrian Gas Find

OeMV's well Aderklaa No. 78, Vienna basin, has discovered at 9,357 ft. a gas horizon, the first gas found in the Triassic. Pressure is high for Austria; 4,260 lb sq in., compared with 2,130 lb/sq in in the Zwernforf gas field. The gas contains small quantities of sulfur. Austria's exploitable gas reserves are at present estimated at 25 billion cubic meters (882.75 billion cubic feet).

Romania Refuses Crude To Yugoslavia

Under its trade agreement for 1959, Romania has refused to continue deliveries of crude oil to Yugoslavia on the ground that in 1958 Yugoslavia used its 70,000-ton-quota for crude but only imported 1,000 tons of its 36,000-ton-quota for products. Romania consented in the Brioni agreement of 1956 to deliver some crude, designated as products since in principle Romania does not export crude. The value of the item "Petroleum products" was settled at Brioni at US $2.5 million per year. Under the 1959 agreement Romania will deliver 95,000 tons of products valued at US $2.5 million—but no crude.

USSR-1,700 Wells For Kuybyshev

By the end of 1965, about 1,700 wells are to be completed in the Kuybyshev area, raising crude output 2.5 times. A 9,843-ft well in the Kokhan field alledgedly yielded 160 tons per day (800 b/d) in April. So far, 4 oil-bearing horizons have been found in the Kokhan field, situated in the Kuybyshev area.

Island Wildcat In Australia

Preparatory work in Australia's first offshore oil search has begun on tiny Wreck Island, 53 miles northeast of Gladstone. The Australian Government will pay half the cost of the stratigraphic test.

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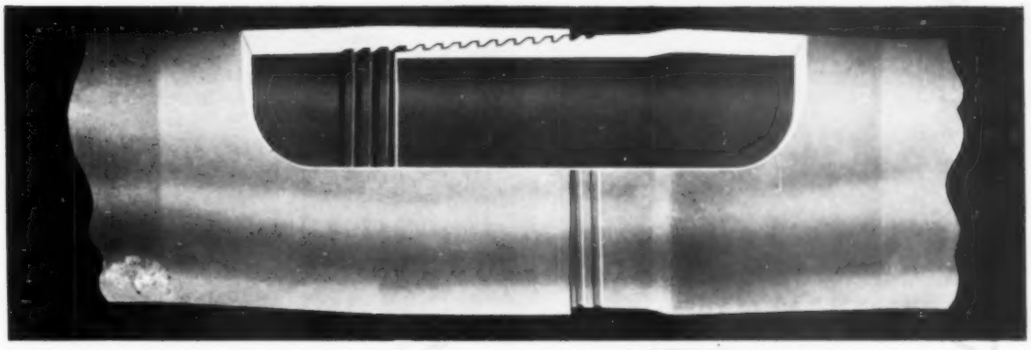

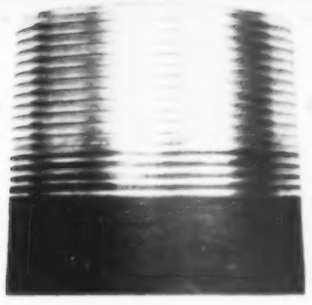

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GERMANY

Washington Pipeline

(Continued from page 6)

Venezuela Hits Borden Report

Dr. Carlos Perez de la Cova, Minister-Counselor for Petroleum Affairs to the Venezuelan Embassy, took a dim view of the second report of the Borden Commission in Canada.

He expressed concern about implications in the report that Montreal refiners might be forced to cut down their imports of crude oil from Venezuela and elsewhere in years to come in order to make room for crude oil from Western Canada.

"That possibility, however remote," he said, "should be a matter of concern to Venezuela. Although no immediate action which would close the Montreal market to foreign crude is expected to be recommended now, the report warns major oil companies to utilize more Canadian crude oil or face import licenses which would curb their exports to Canada from Venezuela and other areas. That possibilty, however remote, should be a matter of concern to Venezuela.

"Canada is our second best customer, taking between 10 to 11% of Venezuelan crude oil exports. In 1958, about 65% of the refinery crude oil receipts at Montreal came from Venezuela. Therefore, any loss or substantial reduction of the Canadian market for Venezuelan oil would adversely affect our commercial relations with Canada and would impair our foreign exchange income.

"It is to be deplored that in these troubled times the forces of economic nationalism and the pressures from special groups are gaining ground just when the leaders of the free world are emphasizing the need for more international free trade.

"From the standpoint of the security and defense of the Western Hemisphere, it seems to me that it is most unwise to impose trade barriers to the Inter-American trade of such a strategic commodity as oil, the availability and flow of which are essential for the civilian and military requirements of the free world.

Seek Tanker Legislation

A drive is under way for legislation to force oil importers to use American flag tankers for at least part of their shipments. Joseph Curran, president of the National Maritime Union of America, and Paul Hall, president of the Seafarers International Union, are moving forces in the drive. They claim the American flag tanker cannot exist unless it can get a "reasonable" share of the oil import business. American flag tankers carried 76% of oil imports in 1946, but now only about 2%, they say. This is because of lower costs of operations under flags of convenience. The shipowners use the term "flags of necessity."

Treasury Finds No Oil Dumping

The U.S. Treasury Department has brushed off complaints that Romanian oil was being sold in the U.S. at dump prices. Treasury said it found "no information" to this effect after studying a complaint from the Independent Petroleum Association of America. Treasury added that a January shipment of about 15,000 tons of coke oven crude tar and a February shipment of about 15,000 tons of residual oil appear to be "a onetime operation." If imports are sold in the U.S. at less than fair value, and the sales hurt the U.S. domestic industry, the U.S. has the right to levy import duties equal to the difference between the foreign value and the selling price.

New Desk & Derrick Officers

Miss Sophie Edmundson, secretary to H. S. McQueen, vice president of Salt Dome Production Co., has been elected president of the Desk and Derrick Club of Houston for the year 1959-1960. Other officers elected are: Miss Myrtle Heis of Humble Oil & Refining Co., Mrs. Florynne T. Brandon who is with Cecil V. Hagen; Miss Velma Monk of Phillips Petroleum Co., recording secretary; Miss Virginia Renick with D. C. Cheesman & Son; and Mrs. Annie Mae Cooke of Hardy Oil Co., treasurer.

Front row, from left: Florynne Brandon, second v. pres.; Sophie Edmundson, pres.; Myrtle Heise, first v. pres. Back row, from left: Virginia Renick, corr. secy.; Annie Mae Cooke, treas., and Velma Monk, recording secy.

$140 Billion For New Oil

Chase Manhattan Bank survey forecasts Free World will have to spend estimated $140 billion on expansion between now and 1967 if energy demands on industry are to be met during next decade. Natural gas poses a dilemma. Discovered and produced along with oil, it displaces the more valuable oil when it enters the energy market. "If current conditions go unchanged, there could be detrimental effect upon nation's reserve of energy resources. If gas, which yields relatively little revenue to the oil industry, continues to displace oil, there may not be sufficient funds generated in the future to support an adequate exploratory effort" for oil.

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Jersey Standard Consolidates

Standard Oil Co. (N.J.) has begun a program to consolidate all its principal U.S. affiliates into a single, nation wide organization, with the first major step in the plan being a merger of Jersey Standard with Humble Oil & Refining Co., its largest U.S. affiliate.

Prior to the Jersey-Humble merger, a new Humble Oil & Refining Co. will be incorporated in Delaware. The properties and operations of the present Humble, which is incorporated in Texas, would be transferred to the new company in exchange for 100% of its stock.

Next steps in the consolidation plan will be to merge the following principal affiliates into the new Humble company: Esso Standard Oil Co., the East Coast refining and marketing affiliate; Carter Oil Co., the Tulsa-based producing company; Oklahoma Oil Co., which operates service stations in the Oklahoma area; and Pate Oil Co., a marketer in the Milwaukee region. All are 100% owned by the parent company.

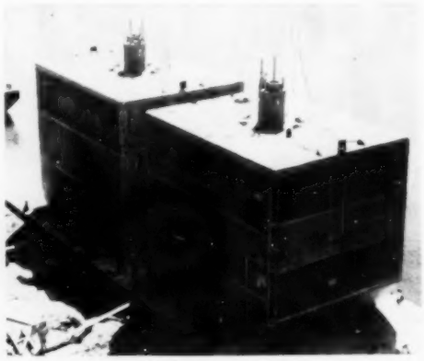
Seven other 100% owned U.S. affiliates were not mentioned in the announcement of consolidation. They are Enjay Co., Esso Export Corp. Esso Tankers, Inc., Gilbert & Barker Mfg. Co., Interstate Pipe Line Co., and two research organizations—Esso Research and Engineering Co. and Jersey Production Research Co.

Improved efficiency was cited by Jersey Standard as the reason for the decision: "It is expected that a substantial improvement in the effectiveness of the operations of these various companies will be achieved by such unification which should be advantageous to the shareholders of both Jersey and Humble."

The annual business of Jersey's U.S. companies is $2.7 billion, representing 36.5% of its world-wide volume, which last year totalled $7.5 billion.

Final details of the plan still have to be worked out, Jersey stated. Tentatively, Humble shareholders will receive five shares of Jersey stock for each four shares of Humble stock. This ratio is the same as that offered to Humble shareholders in July, 1958, when the parent firm increased its ownership of Humble from slightly less than 88% to the present 98.27% of Humble's outstanding shares.

A name for the new nation-wide organization has not yet been selected. Initially, the units now operating as individual companies will continue to operate, in general, under their present names and managements as divisions of the new company.



Aluminum tanks installed in the "Methane Pioneer" for ocean shipments of liquefied gas.

Methane Tanker Licensed

The "Methane Pioneer," first tanker to transport liquid natural gas by sea, has successfully completed her first annual survey by the American Bureau of Shipping and Lloyd's Registry of Shipping. The "Methane Pioneer" is owned by Constock International Methane Ltd. and the British Gas Council.

The "Methane Pioneer" went into dry dock at Mobile on August 5, after making three successful deliveries of its unusual cargo from Lake Charles, La., to Canvey Island near London, England. The ship's aluminum tanks containing the cold liquid at minus 258° F, the special balsa wood insulation, and all the cargo handling facilities showed no signs of deterioration.

First Offshore Well In Florida

Coastal Caribbean Oils, Inc. has reached an agreement with The California Co. for exploration of 4,000,000 acres of Florida offshore leases held by Coastal Petroleum Co., a Coastal Caribbean subsidiary, and the drilling by the California Company of the first well off the northwest Florida coast. The agreement also provides for Coastal Caribbean to conduct a limited program of drilling on an additional 500,000 acres in the Lake Okeechobee area.

Esso Developes New Lube

Development of a new oil that significantly reduces wear in free piston engines—possible successors to diesel engines—has been announced by Esso Research and Engineering Co. Field tests of the new lubricant have been in a series of trans-Atlantic runs by the converted Liberty ship, G.T.S. William Patterson.

Hall New SEG President

T. O. Hall, president of General Geophysical Co., has been elected president of the Society of Exploration Geophysicists (SEG) for the 1959-60 year.

International Investment Study

Legal Aspects of Foreign Investment, edited by Wolfgang G. Friedmann, Professor of Law and Director of International Legal Research, Columbia University, and Richard C. Pugh, Assistant Editor of the New York Bar. This is a series of case histories of 40 countries, written by authorities within each, most of them nationals of the country concerned. Major emphasis is on the forms of

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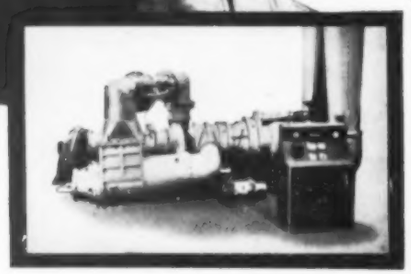

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business organizations available to the international investor and on the merits of each as concerns managerial control, income withdrawal, etc. It is useful for oil investors in its history of investment and as a broad guide to the major laws applicable to business generally. Published by Little, Brown & Co., Law Book Dept., 34 Beacon Street, Boston 6, Mass. Price $20.

Names Assistant Vice Presidents

Three assistant vice presidents have been named by Stone & Webster Engineering Corp., two in Boston and one in New York. They are Robert S. Boyd, appraisal manager, J. Marshall Hamill, administrative assistant in Boston, and Wilbur S. Roberts, Jr., manager of new business activities in New York.

Socony Reorganizes

Operations of the principal wholly-owned affiliates of Socony Mobil Oil Co., Inc., in the United States are being combined with the parent company's domestic operations into a single coast-to-coast operating unit, Mobil Oil Co.

The transfer of operations will affect three affiliates: Magnolia Petroleum Company in the Southwest, General Petroleum Corp. in the Far West, and Mobil Producing Co. in the North Central and Rocky Mountain states. The operations that these affiliates have carried on will become the direct responsibility of Mobil Oil.

The changes are part of a new over-all organization plan, the first steps in which were taken by the Socony Mobil management more than two years ago. The plan went into effect for the company's top corporate structure and for its international operations on March 1 of this year.

No change in the ultimate ownership of any properties is involved. Magnolia and General Petroleum have been wholly owned by Socony Mobil for more than 30 years, and Mobil Producing was organized by Socony Mobil in 1954.

J. L. Latimer, now president of Magnolia, and R. L. Minckler, now president of General Petroleum, will be senior vice presidents of Mobil Oil Company.

Fred H. Moore, new executive vice president of Magnolia, will become vice president of Mobil Oil in charge of exploration and producing. Henry L. Waszkowski, now vice president of Mobil Oil, will become general manager of the Socony Mobil corporate exploration and producing department. R. Rea Jackson, now vice president of Mobil Oil in charge of refineries, will become vice president in charge of manufacturing and distribution.

The management of Mobil's domestic business has been carried on by separate departments in Mobil Oil and in each of its domestic affiliates. The practical effects of this new plan will be to group in nationwide operating departments each of the principal functions of the business—exploration and producing, refining, transportation and marketing.

Under the new organization plan, Magnolia and General Petroleum producing men and the Mobil producing operation will work through the Mobil Oil producing department. The Magnolia refinery at Beaumont and the General Petroleum refineries at Torrence, California, and Ferndale, Wash., will become part of the Mobil Oil manufacturing department. Magnolia and General Petroleum marketing operations will be conducted through the Mobil Oil marketing department.

New Chemistry Book

Liquid-Liquid Extraction, by L. Alders, Research Chemist, Koninklijke Shell, Amsterdam (The Netherlands). Intended to serve as a manual for those concerned with liquid-liquid extraction. Though this is primarily a practical book, the theory of phase equilibria is dealt with in so far as these may be encountered in extraction problems. The experimental procedures that furnish the data required for extraction calculations are described. The author then goes on to discuss the mathematical solutions of extraction problems and the theories on which they are based. Finally, he describes laboratory-scale operations that can be carried out to obtain information about the results that may be expected in industrial extraction processes. Published by D. van Nostrand Co., Inc., 120 Alexander St., Princeton, New Jersey, USA. Price $8.50.

New East German Petrochemical Text

German Petrochemistry Textbook A East-German expert, Professor F. Asinger, wrote this introduction into petrochemistry. With the help of 131 tables and 187 illustrations—mainly showing manufacturing processes, composition, and uses of the products—the author gives a concise survey of modern petrochemistry. The first part of the book deals with the raw materials of the industry (paraffin hydrocarbons, mono-olefines, diolefines, acetylene, cyclohexan, and aromatic hydrocarbons from mineral oil), the second with chemical utilization of hydrocarbons by such means as chlorination, nitrification, oxidation, alkylation, polymerization, etc. It also goes into the purification of the final petrochemical products, including cyanic acid, soot, hydrogen. Publisher is Akademie-Verlag, Mohrenstrasse 39, Berlin W8. 444 pages. Price DM 33.

New Publications

Unfired Pressure Vessels (Section VIII, ASME Boiler and Pressure Vessel Code). The American Society of Mechanical Engineers, 29 West 39th St., New York 18, N.Y.

The new book incorporates all changes that have been made in the code since 1956, date of issue of the last edition. Most of these changes have appeared over the past three years in the form of addenda to the code and are now an integral part of the text. One of the major revisions concerns a ruling on modular cast iron.

Statistical Review of the World Oil Industry, 1958—British Petroleum Co.'s 14-page brochure, now published under this title for a number of years, has increasingly become accepted as an authoritative source of reference for the data it covers and there are many who wish it were greatly extended in its scope. The latest edition tabulates, with supporting colored diagrams, the 1958 statistics

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(together with the revised 1957 figures and in many case earlier years) on: (a) world "published proved" oil reserves; (b) production; (c) consumption with the change from 1957 and the average 1953 to 1958; (d) world oil supply and demand 1958; and international oil trade 1957 and 1958 by main areas; (e) world oil refining capacities 1957 and 1958 and percentage refining yields. A limited number of copies are available, and requests should be sent to BP (Information Department) at Britannic House, Finsbury Circus, London, E.C. 2.

Petrochemical Calculation Methods Based on Equivalent Principles (In German). By Prof. Conrad Burri. Published by Birkhaeuser Verlag, Basel, Switzerland. Title in German is "Petrochemische Berechnungsmethoden auf Aequivalenter Grundlage." Contains tables of equivalent number of rock-forming oxides, and discussion of relation between Paul Niggli's methods and T. T. W. Barth's standard cell. Contains many complete calculations based on the Niggli value si, al, fm, c, alk, k, mg, ti, p, etc., as well as on his equivalent norm. 334 pages (66 illustrations). Price is 38 Swiss francs (about $9.50).

New Alaskan Oil Book

The Alaskan Oil and Gas Handbook, edited by Arthur Troutman, covers Alaska's geology and each of the prospective oil and gas areas of Alaska. Summary of geological data. Maps. Location of known structures. Oil seeps. Factual data on present oil and gas procedure. 76 pp, published by Oil Frontiers, Box 221, Capital Station, Austin 11, Texas.

Realistic Policy Needed

Canada's oil-producing industry would be better able to adjust to changes in demand and compete for markets if less incentive were given to drilling new marginal wells and more to production from highly productive fields, said J. R. White, Imperial Oil Ltd. president. Measures needed to relieve investment pressure on western Canada's producing industry include (1) adoption of a realistic USA policy on import quotas; (2) adoption of measures to adapt the rate of development of new crude-producing capacity in western Canada to current conditions, particularly in Alberta, where changes in the method of administering prorationing are called for.

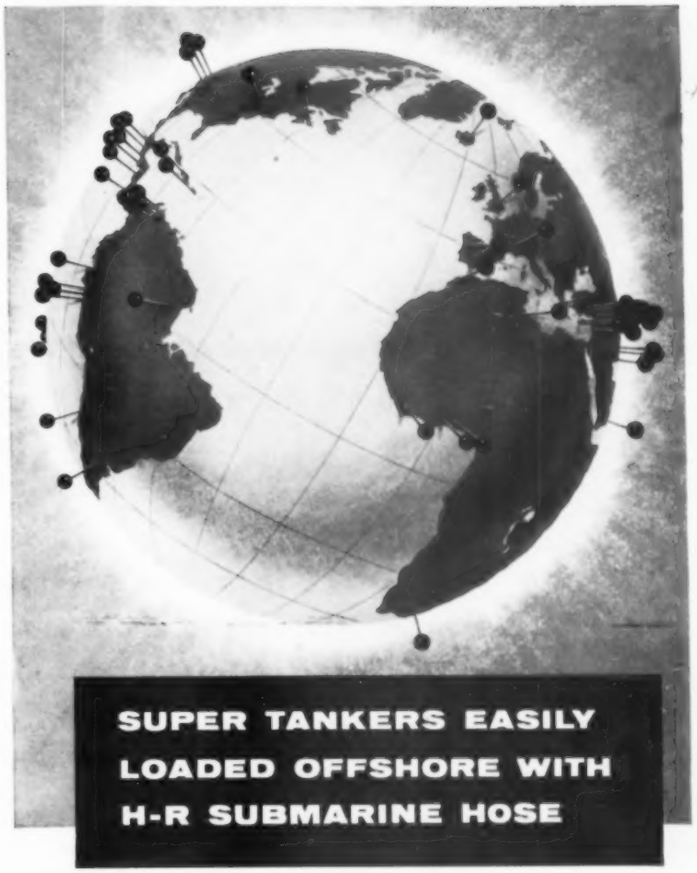
Canadian Pipeline Rates Cut

Interprovincial Pipe Line Co. has announced a cut in the rate for carrying crude oil from western Canada to Sarnia and the Toronto area. The rate will be cut eight cents a barrel from Edmonton to Sarnia and five cents from Cromer to Sarnia. The additional charge from Sarnia to Toronto will be cut from eight cents to four cents a barrel. T. S. Johnston, president of the pipeline, said the rates will be cut to points in Michigan as soon as tariffs can be filed with the US Interstate Commerce Commission.

The new rates from Edmonton to Sarnia will be 56 cents, and from Edmonton to Toronto 60 cents. Tariffs from other points to these areas are being reduced in proportion. Mr. Johnston said the company made the decision in view of the expected opening soon of the St. Lawrence Seaway and the recent reduction in prices for foreign crudes.

British Pipe For Assam

A £2 million contract to supply about 270 miles (32,000 tons) of 16-in. steel pipe to API standard 5L X46 has been received by Stewarts & Lloyds Ltd. from Burmah Oil Co. on behalf of Oil India Private Ltd., a new company in which BOC and the Indian government are partners. The pipe will be made at S & L's Clydesdale works and delivered between September 1959 and March next at the rate of 4,000 to 5,000 tons a month for use in constructing a pipeline connecting Assam Oil Co.'s shut-in oilfields at Nahorkatiya and Moran, capable of yielding 2½ million tons a year, to a refinery to be built near Gauhati which is expected to go into operation in 1961. A later extension to a second refinery would make the total length of the line 720 miles. India recently accepted credits of £3 million from the UK government and £20 million from BOC towards the sterling exchange costs of these pipeline and refinery projects.



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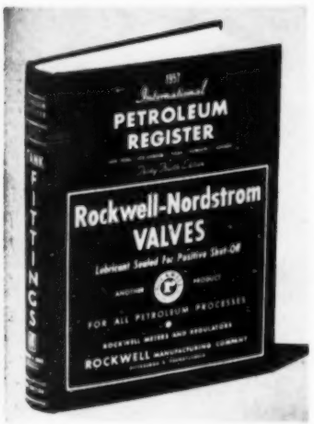

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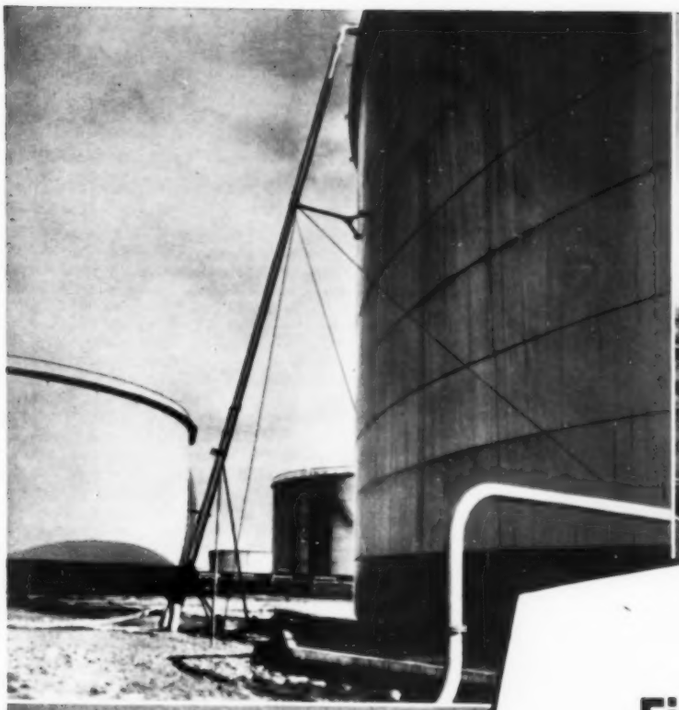

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Regulations Spur Arctic Hunt

Northern Affairs Minister Alvin Hamilton stated recently: "It has been thought for some time that large areas north of 60 degrees in Canada may have large oil and gas possibilities. An oil exploration program, which . . . in terms of land area is one of the largest in the world, is now under way."

Regarding northern resources, he stated that the system adopted by the government to achieve these ends is the Crown Reserve System as used in parts of the USA and in Canada's western provinces.

There will be only one important difference in the matter of oil policy for the area north of 70 degrees—the Arctic Islands—and that is the length of the permit period. Said Mr. Hamilton:

"Recognizing the fact that this is perhaps the most difficult area of the world to carry on exploration and production of oil and gas, particularly with an extremely short summer season, we are proposing that the initial exploration period will be extended by three years."

Earlier, Mr. Hamilton informed the Commons that Canadian individuals and corporations hold exploration permits on 68.74% of the 86,000,000 acres taken up in the Arctic Islands. USA corporations hold 14.72%; Canadian subsidiaries of USA corporations hold 13.33% and British corporations hold 3.21%.

The anticipated expenditure of $200 million during the next five years was based on the acreage for which permits have actually been issued or firm applications made. He said these exceed 171 million acres—"more than seven times the area now under disposition in Saskatchewan and 2½ times the area now under disposition in Alberta."

Heads International Sales

M. L. Mandeville has been named vice president and director of sales of the International Division of U. S. Industries Inc. He formerly was assistant general manager of sales of the Continental Can Co. (Overseas Division).

W. A. Davidson

C. L. Roach

Hawthorne Promotion

W. A. ("Bill") Davidson has been appointed general sales manager at Herb J. Hawthorne Inc., Houston, manufacturers of "Blue Demon" replaceable blade bits. He joined Hawthorne as a sales representative, following 11 years with an oil-industry supply firm. In the fall of 1958, he was advanced to assistant sales manager at Hawthorne.

Chicago Pneumatic Engines

Stewart & Stevenson Services, Houston, has been named a distributor for the industrial and oil-field industries of Chicago Pneumatic engines in sizes up to 2,000-hp. The company also sells General Motors diesel and Chrysler industrial and marine engines. Two new models of C-P engines are particularly adaptable for heavy-duty high-horsepower oil-field and industrial applications.

Sensater Weight Indicator

The Martin-Decker Type "F" weight indicator is now available with the company's "Sensater" sensing element as an integral part of the wire-line anchor. The new model, known as the Type "FS," realizes every weight change immediately, no matter how small. A copy of Martin-Decker's new catalog of drilling control instruments is available upon request.

New HOMCO Appointment

C. L. Roach of Houston, Texas, has been elected vice president in charge of all domestic operations of HOMCO. He was in charge of Oil Equipment, Ltd., HOMCO's Canadian Affiliate.

Durkin for Chiksan Export

L. L. Durkin has joined Chiksan Export Co. as senior sales representative. His first assignment, just concluded, was a tour of South America oil fields.

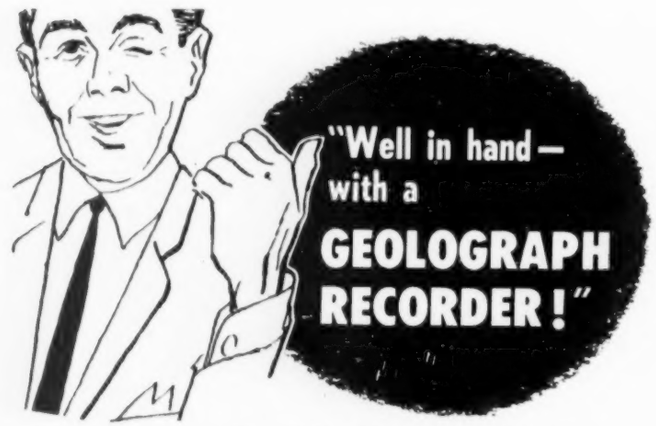
Detects Chlorine in Oil Wells

A nuclear logging system to detect salt water behind the casing in oil wells recently was introduced by Perforating Guns Atlas Corp. The new technique is a tool to economically determine the fluid content of a single or large number of zones without the triple operations and substantial expense of perforating, testing, before final well completion. Designated as PGAS's "Spectral Log," it is employed to determine the presence or absence of saltwater—and therefore, conversely, the absence or presence of oil—in a formation. Such information permits the establishment of oil-salt water interfaces and transition zones, even with formation waters having chlorine concentrations as low as 12,000 ppm.

USSR Gasoline Pipeline Completed

The 466-mile gasoline pipeline between Omsk and Novosibirsk has been completed. This line will be part of the pipeline system which will span the whole of Siberia, connecting the Ural area with Vladivostok, in the Sea of Japan, which are about 3,974 miles apart.

The location of the pipeline from the Gazli gas field in Uzbekistan to the industrial areas in the Ural mountains has new been layed out. The 1,118,-mile-long section Gazli-Chelyabinsk is to be completed by 1963 and the 124-mile-long stretch to Sverdlovsk by 1965.



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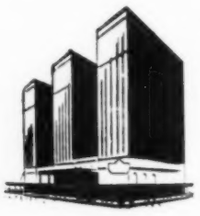

Houston's Welcome to the World

New Kellogg Computer

Engineers and designers unfamiliar with computer programming or terminology, and without recourse to a specially devised vocabulary, are using a computer to solve process plant design problems at The M. W. Kellogg Co., New York. Computer solutions are printed out in an engineering terminology, and the company has built a general program which will: (1) translate information supplied by engineers into digital computer language, (2) write a computer program for any process flow sheet, and (3) instruct the computer to make the calculations and print out the results. Kellogg's general program has enabled the company to work out more than 30 major and minor programs (e.g.—plans for solving problems in refinery and chemical plant engineering).

Halliburton R-3 Packer

The new Halliburton R-3 Treating Packer has been designed for treating, water flooding or producing. The tool is short, compact, and retrievable. The full-opening packer is designed to run on tubing into a cased hole to isolate a section to be treated or produced in oil, gas, or water-injection wells.

The packer, built to withstand up to 5,000 psi working pressure differential, is designed to run primarily as a tension packer, where the packer is set by turning to the right and applying an upward pull on the tubing. It may be used at shallow depths where insufficient tubing weight is available to set in compression a conventional hook wall-type packer.

Round-Trips Eliminated

Downtime has been reduced by as much as 95% with the new "CR" (for continuous retrievable) sampler introduced by Halliburton Oil Well Cementing Co. The combination drilling-testing tool allows the packer to be run above the bit so that a formation may be tested at any time without the operator having to remove the pipe from the hole, thereby saving two round-trips necessary to install testing tools and later remove them as in conventional testing. The sampler has two main assemblies. The tool body contains the packer and packer inflation valve. The sampler assembly consists of a fishing neck for sand-line removal, an optional number of retrievable sampler barrels, a pressure-operated sampler valve, and a BT pressure-recording device. The sampler is operated hydraulically by pump pressure —no rotation or up and down movement is required.

Packaged Pipeline Control

A new line of packaged control systems, designed for any degree of compressor automation, and already thoroughly job-tested, has been introduced by Clark Bros. Co. Division of Dresser Industries, Olean, N.Y. Consisting of three basic control panels, these range from a simple engine-start system to a fully automatic engine and compressor control for remote location. With the addition of a computer controller and telemetering equipment, any number of remote automatic panels can be tied together for the automation of a complete station or pipeline.

Geo-Sciences and Instruments

Texas Instruments Inc. has formed a GeoSciences and Instrumentation division, and elected Fred J. Agnich as a TI vice president to head the new division. Cecil H. Green has been elected honorary chairman of Geophysical Service Inc.

274,000 Barrel Floating Roof Tank

What is believed to be the world's largest floating roof tank has been put into service at Tidewater Oil Co.'s Delaware Refinery. The tank, the first of two being constructed, has a capacity of 274,000 barrels of crude oil and is made of formed steel plates ranging up to one-and-a-half inches thick. The tanks will be 56 feet high and have a diameter of 187 feet.

Israel's Pipeline Plans

Participation in a $20 million Israel oil pipeline project (linking the Red Sea with the Mediterranean) was recently announced by Palestine Economic Corp., New York. Under a concession signed by the Israel Government on July 17, an international investment group, headed by Edmond de Rothchild, will own and operate a 16" pipeline from Eilat on the Red Sea to Haifa on the Mediterranean, a distance of 257 miles.

tween Beersheba in the Negev and Haifa, is already

One section of the 16" line, a 122-mile stretch beto Beersheba, which has at present an 8" line, will have the 16" line, now under construction, comin existence, while the 135-mile section from Silat pleted by next July. At that time the Eilat-Haifa line will have an annual capacity of 1,700,000 tons (35,000 b/d). The planned installation of additional pumping and storage facilities will increase this capacity to 2,900,000 tons (58,000 b/d.) by March 1961, and, if sufficient domestic and/or transit business develops, it can be further stepped up to a total of 5,800,000 tons a year (116,000 bbls/day). Under a guarantee by the Israel Government, the minimum annual return on the outstanding investment will be 8%.

O'Brien Named At U.S. Industries

R. D. O'Brien has been advanced to the post of group executive for the two petroleum equipment divisions of U.S. Industries, Inc. He is now charged with the executive guidance of USI's Garrett Oil Tools and Axelson Divisions. He will assist the autonomous management of each division.

Clark Bros. Appointments

Clark Bros. Co. Division of Dresser Industries Inc., Olean, N. Y., has appointed William Dumar and Joseph A. Goodnough as sales engineers in the Mid Continent area served by Clark's Tulsa office.

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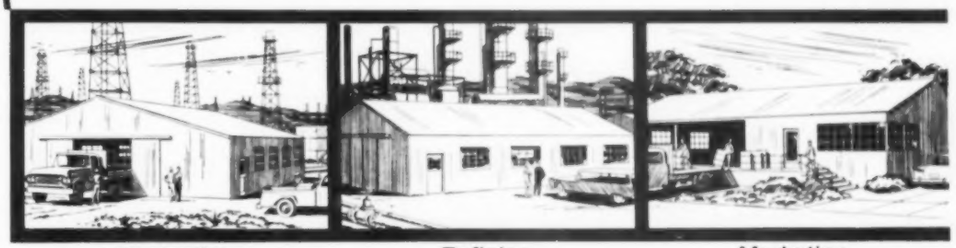

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Kuwait
National Contracting Co.
Kuwait, Arabian Gulf

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H. R. Reyes & Company, Inc., Manila

• 6683

Pneumatic Mud Transports

Halliburton Oil Well Cementing Co. is delivering a series of truck transports equipped with Halliburton pneumatic bulk material handling system to Kaffie Lumber and Barites, Inc., of Corpus Christi. This is the first sale of Halliburton pneumatic bulk transports for over-the-road hauling and well site pneumatic delivery of bulk muds.

New Sales Manager For BJ

Jerry F. Boutwell has been appointed sales manager of the oilwell pump section of Byron Jackson Tools, Inc. Mr. Boutwell, who has 12 years of experience in submersible pump sales, will headquarter in Byron Jackson's Tulsa plant.

BJ Service In Bolivia

BJ Service, Inc. has established a new field station in Yacuiba, Bolivia. The Bolivian move marks the second major step in a planned BJ Service program of international growth and expansion. The initial move was completed last September with establishment of a new Canadian oil well service company, BJ Service of Canada Ltd.

Fairchild's New Gravity Meter

A considerable step forward in airborne gravity meter work has been made by Fairchild Aerial Surveys. While it has significance for the oil industry, which has used airborne gravity meters with success for many years, it also for the first time put it within the possibility of man to accurately measure the face of the earth.

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Grant Oil Tool Promotions

Grant Oil Tool Co. has appointed Don Etter as sales manager and Leland Auer as chief engineer. Mr. Etter was manager and Mr. Auer was chief engineer of Cosasco division of Perfect Circle Corp. prior to Mr. Grant's recent acquisition of Cosasco. Mr. Auer succeeds Clarence Leathers, who has been promoted to executive engineer of Grant and its MacClatchie and Cosasco division.

Solvent-Weld Repair Clamp

A method of "in the field" repairs of plastic pipe was announced by Kraloy Plastic Pipe Co. of Los Angeles. "Hot" repairs on intermediate pressure gas lines as well as pipe lines carrying liquid can be made.

Johnston Testers Appointment

T. W. Cole has been named Rocky Mountain area manager at Casper, Wyo., by Johnston Testers, Inc. Mr. Cole has been with Johnston since 1950, and has been assistant area manager in Casper since 1948.

W-K-M Executive Appointments

Robert O. Wynn has been appointed vice president of engineering and research and Henry C. Tooley vice president of manufacturing of the W-K-M division of ACF Industries, Inc. Mr. Wynn has been vice president of Manufacturing for W-K-M since 1956 and Mr. Tooley joined W-K-M in May of this year as manager of the Missouri City, Texas plant.

Kellog Appoints Leduc

The M. W. Kellog Co. has announced appointment of Dr. Adrien LeDuc as research associate.

Beaird Expands In Canada

Assignment of additional personnel and a new permanent headquarters for Beaird International Inc. have been announced for expanded operation in Canada, for the Western Hemisphere trading organization of The J. B. Beaird Co. Inc., Shreveport, La.

Joining Charles W. Haynes, vice president of Beaird International in the new Calgary office, are sales engineers B. D. Cass and Murphy Horton. New permanent headquarters for Beaird International Inc. have been established in the F. W. Clark Building in Calgary.

Dowell Foreign Division

John Staudt, executive vice president and director of the Dowell Division Dow Chemical Co., is president of the newly-organized Dowell Division of Dow Chemical International Ltd. SA. Other officers include A. C. Polk and L. B. Swan, vice presidents; Tromer R. Smith, general manager; Neil Miller, treasurer; and J. H. Hanes, secretary. Directors of the new division are the above named officers, A. P. Beutel, and Oliver E. Beutel.

Messrs. Staudt, Polk, Miller, and Hanes are with Dowell in Tulsa; Messrs. Swan and Smith will be located in the new Dowell foreign headquarters in Houston. A. P. Beutel, also a Dow Chemical director, has his office at Freeport, Texas, where he is general manager of the Texas division of Dow. He is also president of Dowell. Oliver E. Eeutel is located at the Midland Mich., headquarters.

Well-servicing equipment is being assembled now in Dowell's Tulsa shops for shipment to Argentina, where it will be used to provide oil-well cementing and pumping services.

Badger Promotion

Philip H. Seaver has been appointed sales manager, engineering sales, and Robert E. Siegfried, assistant engineering manager of Badger Manufacturing Co., Cambridge, Mass.

A. K. Baebel

T. M. Short

Hughes Export Sales Appointments

Appointment of A. K. Baebel as manager of export sales for the Western Hemisphere, with headquarters in New York, has been announced by Hughes Tool Co. He succeeds O. B. Latrobe. Mr. Baebel was manager of the northern division of South America, in Maracaibo, Venezuela. He has been with Hughes since 1940, and went to South America in 1948. T. M. Short succeeds Mr. Baebel.

Jurs Heads Shand And Jurs

Peter C. Jurs has been elected president of Shand and Jurs Co., to succeed R. M. Young, who becomes chairman.

Elects Four Vice Presidents

Four top executives of Stone & Webster Engineering Corp., have been elected vice presidents. The new vice presidents are Harold F. Cleary and Donald N. McCord, construction managers; M. H. Cutler, engineering manager, and William R. Prang, West Coast district manager.

Hargrove Joins Badger

Robert G. Hargrove, formerly assistant manager of the engineering division of Socony Mobil Oil Co., has joined Badger Manufacturing Co., Cambridge, Mass.

Waterflood Unit

A complete waterflood package engine and pump with capacity up to 23,600 b/d is now being marketed by the White diesel engine division of The White Motor Co. The engine is a four cycle, six cylinder Superior G-510 that operates on natural gas or propane within the 190-400 BHP range.

Directly connected to the engine through a flexible coupling is an "Oilwell" #368-P Triplex pump operating with $5\frac{1}{2}$" to $6\frac{1}{2}$" plungers over the 600-840 PSI range. Reduction is handled within the pump itself, eliminating the need for an intermediate gear.

Heads Buenos Aires Lab

Robert O. Albert has been named manager of the Buenos Aires laboratories of Petroleum Technologists, Inc., the company's second South American location, it has been announced by Dr. Norris Johnston, president of the Dallas laboratory company.

LeTourneau Appoints Fain

Stan Fain has been appointed manager of advertising and sales promotion for R. G. LeTourneau, Inc. of Longview, Texas. In his new position, he will head the LeTourneau advertising and sales promotion department and also will direct the LeTourneau marketing activities of D'Arcy Advertising Co., handled through that agency's offices in Houston.

P. H. Seaver

S. Fain

Pipeline Metering Bulletin

B-I-F Industries Inc., Providence, R.I., has announced a new application bulletin describing the Proportioneers meter accounting system for summating multiple meter flows in the pipeline industry. This system maintains continuous and accurate printed records from numerous remote meters along the pipeline, simplifying cost accounting records.

Free copy of the bulletin, *Bulletin SM-3280*, may be obtained from B-I-F at 345 Harris Ave., Providence 1, R.I.

HOMCO Acquisition

Purchase of Associated Oil Field Rentals, world's largest oil-tool rental company, by Houston Oil Field Material Co. Inc., has been announced by Hugh O. Buck, acting president of HOMCO, and Harry J. Mosser, chairman of Associated Oil & Gas Co., of which the rental firm was a division. Purchase price was reported as approximately $8 million.

Plant Design Brochure

"The Plant You Want to Build" is the title of a new brochure now available from Foster Wheeler Corp. for distribution to engineers and executives engaged in the chemical, petrochemical and petroleum refinery fields. The 24 page piece describes how Foster Wheeler has integrated the facilities of its domestic and foreign subsidiaries to flexibly provide the optimum organization to design, or engineer, or erect whatever plant is desired . . . any process . . . any size . . . anywhere in the world. Write for Bulletin 0-59-1, Foster Wheeler Corp., 666 Fifth Avenue, N.Y.C. (19), N.Y.

Oil Advice To India

Walter J. Levy's advice to India, while consulting to the government on oil problems, is being countered with Soviet advisors recently arrived in New Delhi. Mr. Levy recommended admission of private capital. Now it has been announced that four top Soviet oil experts are currently in India to advise the government on its future program of government oil exploration. Besides assessing the work already done in this field in the first three years of the Second Plan the experts will prepare a schedule of work for oil exploration in the remaining period of the Second Plan.

Russian Developments Reported

Lubricating Oils and Greases in the Soviet Union. By N. Cheremeteff, Engineer Research and Development Laboratories, U.S. Army. May 1958. 114 pages. (Order PB 151294 from OTS, U.S. Department of Commerce, Washington 25, D.C., $2.50). The report is divided into three chapters: Lubricants; Silicons and Oil Additives; and Greases. Tables which give the characteristics of the different types of lubricants supplement the text. Emphasis was placed on oil additives used to counteract wear, oxidation, mechanical deposits, unstability, poor viscosity, and results of temperature variations. The various additives are defined, and their characteristics and functions are given. The Russians, according to the review, are stressing lubricating oils obtained from high sulfur crudes. This apparently is due to the shifting of petroleum yields from Baku to the Ural and Povolga regions which produce sulfuric oils. In 1960, it is expected that three-fourths of all Russian petroleum products will be derived from these areas. Sixty percent is produced there now. Descriptions of the standard Soviet thermal stability test, corrosion test, and detergency test are presented. A table showing the chief characteristics of the internal combustion engines referred to in the text is included.

Oil Publication For The Far East

Proceedings of the Symposium on the Development of Petroleum Resources of Asia and the Far East—by the United Nations. Designated as document E/CN. 11/507. This volume contains, in about 250 pages, the proceedings and the principal documents of the ECAFE meeting held in New Delhi, India, December 3, 1958. Papers cover geology, status of exploration, some sketchy details on legislation, and papers on technical training and safety programs in the countries of the Far East. Much of this material is unique and should make a valuable addition to an international oil library. Cost is $2.50 in U.S. currency or its equivalent in other currencies. It may be purchased from any of the UN sales agents, the United States agent is International Documents Service, Columbia University Press, 2960 Broadway, New York 7, New York.

Correction

The review of the new Soviet book, *Geochemical Methods of Prospecting and Exploration for Petroleum and Natural Gas*, University of California Press, Berkeley 4, Calif., World Petroleum, August, 1959, p. 68, gave an incorrect price. The sales price of this book is $12.50.

Aramco Announces Trachoma Vaccine

A new advance in the search for an immunization procedure against the different viruses causing trachoma is reported by three Harvard scientists participating in the trachoma research program conducted jointly by Harvard University and the Arabian American Oil Co.

The Harvard and Aramco research has been carried on for five years in the laboratories of the Aramco Medical Department in Dhahran, Saudi Arabia. The first five years of the program have been financed by Aramco grants totaling $500,000. In April Aramco authorized the expenditure of an additional $585,000 to continue the research work for another five years.

Cameron Appointment

W. Roy Davis, formerly sales manager of the valve and oil tool division of Iron Works, Inc., has been appointed as manager of the pressure control equipment division. John H. Grubb will continue as manager of the international division, with responsibility for equivalent activities outside the United States.

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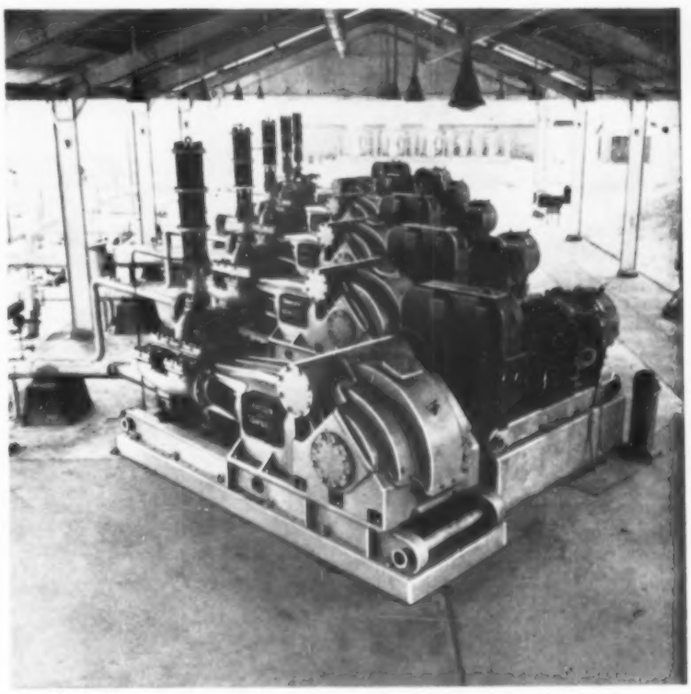

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